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POPULAR  
HISTORY OF REPTILES;

OR,

An Introduction to the Study

OF

THE CLASS REPTILIA,

ON SCIENTIFIC PRINCIPLES.

BY

W. C. L. MARTIN.

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# REPTILES.

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## INTRODUCTION.

THE great section of the animal kingdom, termed VERTEBRATA, or vertebrate animals, that is, animals having a true skeleton, with a vertebral, or spinal column, for the protection of the spinal chord, includes the following classes : MAMMALIA, or Quadrupeds, as they are popularly called ; AVES, or Birds ; REPTILIA, including the Amphibia, (by some regarded as two distinct classes,) namely, Reptiles and Amphibious Reptiles ; and, lastly, PISCES, or Fishes.

Some physiologists adopt the term Spini-cerebrata, in preference to the term Vertebrata. The term Spini-cerebrata, means possessing a spinal chord and brain, and is expressive of the great characteristics of this section. Works on two classes of the Vertebrata, namely, Quadrupeds and Birds, have already been published by the Religious Tract Society ; and following up the series, we devote the present volume to the REPTILES.

Reptiles form one of the most remarkable of the vertebrate classes of the animal kingdom ; and a general survey of these creatures will show the wonderful variety of form and structure, which adapts them for different localities

The beauty of some, resplendent with burnished hues, glittering in the sun like steel and gold; the size, strength, and ferocity of others; the deadly weapons of some, which render them terrible even to man; the strange and uneouth aspect of others; and the habits of all, combine to render them both interesting and instructive to the observant mind.

Some are tenants of the land, some of the ocean, many of the river and the morass, and some are even arboreal in their habits, living amidst the foliage of the trees, intertwined with the branches, or flitting with bird-like celerity from leaf to leaf, and spray to spray, in pursuit of their insect food. The hotter regions of our globe are the great nursery of the reptiles; they teem within the tropical latitudes: there, they swarm in sandy deserts, among dense and tangled brushwood, in humid forests, and wide-spread and pestilential swamps; they colonize the mouldering ruins of ancient towns and cities, temples and palaces; and often lurk in the abodes of man, unsuspected till discovered by accident. It is in these regions that the largest, the most terrible, and the most deadly of their race abound. Tortoises and turtles of huge bulk there crawl on the land, or row themselves through the water. Crocodiles and alligators dart through the broad river, or skulk, waiting for their prey, among the luxuriant herbage of its banks; there the boa and the python are ever ready to entwine the unwary victim in their sinewy folds; there the cerastes lies concealed in the sand, the lance-headed viper lurks in the plantations of sugar-cane, and the cobra, with its hooded head and fiery eyes, startles the wanderer among the ruins of antiquity, and hisses threats and defiance. But if the most terrific abound in these regions, the elegant and the beautiful abound also: tortoises with painted shells; harmless little lizards, enamelled with glossy green and gold, and active as the bird; innoxious snakes, freckled, ringed, and spotted with the most lively tints in exquisite contrast; tree frogs, dyed

with azure, green, and rosy red, springing, all life and activity, from leaf to leaf; and flying lizards, sweeping on expanded parachutes from tree to tree, the tiny mimics of the fabulous dragons of romance and superstition.

As we approach the more temperate latitudes of the globe, we observe a gradual diminution in the number of the reptile part of its animal population; we find none terrible from their size, and but a small number to be dreaded for their poison. As we pass still farther northwards, a few species which are harmless, and one or two besides, furnished with poison fangs, but capable of destroying creatures of small size only, or of a weak frame, constitute the representatives of the fierce, the gigantic, and the deadly, which revel in the thronged regions of the intertropics.

The viper, for example, of England, and northern Europe, is the representative in our latitude of the numerous deadly snakes which infest the countries of the hotter latitudes; and the common ringed snake, a harmless animal, takes the place of the mighty python of Bengal and Java.

Leaving these colder latitudes, the outskirts, so to speak, of the reptile world, and advancing to the countries of the polar circles, we no longer find the snake, the lizard, the toad, or the frog: the low state of the temperature, the condition of the land and the water, and the deficiency of such creatures as constitute their food, namely, snails, insects, and small animals, combine to exclude them from these desolate regions.

Reptiles are cold-blooded animals; that is, their natural temperature is not much, if at all, above that of the atmosphere or water in which they dwell; their power of producing animal heat is very limited, so that the system is immediately affected by the lowering of the temperature of the medium they inhabit. In our climate, and indeed in climates much nearer the meridian, they all undergo a state of torpidity, in some sheltered retreat to which, as a refuge, instinct directs

them, and where they remain during the severities of winter.\*

A high temperature is indeed most congenial to their system : the viper in Italy and Spain is more formidable than the same animal in England and Sweden; and the

\* Mr. Darwin ("Voyages of the Adventure and Beagle," vol. iii.) makes the following interesting observations on the hybernation of reptiles and insects in South America.

"When we first arrived at Bahia Blanca, (s. lat. about  $39^{\circ}$ .) Sept. 7, 1832, we thought nature had scarcely granted a living creature to this sandy and dry country. By digging, however, in the ground, several insects, large spiders, and lizards were found in a half torpid state. On the 15th, a few animals began to appear; and by the 18th, (three days from the equinox,) every thing announced the commencement of spring. The plains were ornamented by the flowers of a pink wood sorrel, wild peas, *cænothra*, and geraniums; and the birds began to lay their eggs; numerous insects were slowly crawling about; while the saurian tribe, the constant inhabitants of a sandy soil, darted in every direction. During the first eleven days, while nature was dormant, the mean temperature, taken from observations under every two hours, on board the Beagle, was  $51^{\circ}$ ; and in the middle of the day, the thermometer seldom ranged above  $55^{\circ}$ . On the eleven succeeding days, in which all things became so animated, the mean was  $58^{\circ}$ , and the range in the middle of the day, between  $60^{\circ}$  and  $70^{\circ}$ . Here, then, an increase of seven degrees in mean temperature, but a greater one of extreme heat, was sufficient to awake the functions of life.

"At Monte Video, from which we had just before sailed, in the twenty-three days included between the 26th of July and the 19th of August, the mean temperature from 276 observations was  $58^{\circ} 4'$ , the mean hottest day being  $65^{\circ} 5'$ , and the coldest  $46^{\circ}$ . The lowest point to which the thermometer fell was  $41^{\circ} 5'$ , and occasionally in the middle of the day it rose to  $69^{\circ}$  or  $70^{\circ}$ . Yet with this elevated temperature, almost every beetle, several genera of spiders, snails, and land shells, toads, and lizards were all lying torpid beneath stones. But we have seen, that at Bahia Blanca, which is four degrees to the southward, and therefore with a climate only a very little colder, this same temperature, with a rather less extreme heat, was sufficient to awaken all orders of animated beings. This shows how nicely the required degree of stimulus is adapted to the general climate of the place, and how little it depends on absolute temperature. It is well known that within the tropics, the hybernation, or more properly estivation, (summer torpidity,) of animals, is governed by the times of drought. Near Rio Janeiro, I was at first surprised to observe, that a few days after some little depressions had been changed into pools of water by the rain, they were peopled by numerous full-grown shells and beetles. Humboldt has related the strange accident of a house having been erected over a spot, where a young crocodile lay buried in the hardened mud. He adds, The Indians often find enormous boas, which they call *ugi*, or water serpents, in the same lethargic state. To animate them, they must be irritated, or wetted with water."

common ringed snake there attains to larger dimensions. Mammalia and birds are warm-blooded vertebrate animals, and their heart consists of two auricles and two ventricles; the left ventricle supplies the system with pure arterial blood, or blood after having been subjected in the capillary vessels of the lungs to the action of atmospheric air. In reptiles, however, the heart consists of but one ventricle and two auricles: and of these the right auricle receives the vitiated blood returned from the system to the heart; the left auricle the arterialized blood returned from the lungs; and both auricles convey their contents into the cavity of the ventricle. This single ventricle, then, (the interior of which, from the interlacement of the muscular fibres, termed *carneæ columnæ*, assumes an almost spongy appearance,) receives both vitiated and arterialized blood, and these become more or less mixed together: part of this mixed fluid is sent through the aorta, or great arterial trunk, to supply the system, and part through the pulmonary arteries, to undergo a further degree of oxygenation in the lungs, this ventricle having both the systemic and the pulmonic arteries (that is, the arteries of the body and the lungs) originating from it. Such is the routine of the circulation in the more perfect of the Reptile class, namely tortoises, lizards, and snakes.

But a large group of reptiles, the Amphibia, at an early stage of their existence, are furnished with gills, and, like fishes, respire water, the gills in due time becoming obliterated, and lungs developed, as in the frog, the newt, etc. Others, however, of this group, though they acquire lungs, never lose their gills, and are at the same time both aquatic and aerial in their respiration; such are the proteus, the siren, and the axolotl. The former are termed Caducibranchiate,\* the latter Perennibranchiate† amphibia. In the latter, the routine of the circulation is as follows: the ventricle receives the blood

\* *Caducus*, perishable; *branchiæ*, gills.

† *Perennis*, durable; *branchiæ*, gills.



from the auricles, and by its contraction transmits it into an enlarged arterial vessel, termed the *bulbus arteriosus*, or arterial bulb, which soon divides into separate branches, one being destined for each leaf of the gills, which essentially resemble those of a fish: here these arterial vessels subdivide into fine capillaries, and these, at length, (as in fishes,) gradually pass into branchial veins, which at last emerge into two vessels, and these unite to form the aorta. Into this aorta, then, the blood purified in the gills or branchiæ, is conveyed without being first sent back from them to the heart, and from this aorta it is distributed through the system. But these amphibia have, besides the branchial, a pulmonie (*pulmo*, a lung) circulation also. The pulmonary artery is given off from the aorta, and consequently conveys to the lungs a portion of the blood which has already passed through the gills, and been there partially oxygenated: in the capillaries of the lungs, it undergoes a still further purification, and is then sent through pulmonie veins to the left auricle, and thence to the ventricle, where, mixing with the vitiated blood of the system, it is thence sent to the gills, and from them to the aorta, whence a portion again passes to the lungs, the rest to the system, and so on in perpetual succession. Now, the caducei-branchiate amphibious reptiles at the commencement of their existence, have only gills truly developed, and the circulation is branchial or fishlike; for the lungs are in a rudimentary state, and the pulmonary arteries are extremely minute. In process of time, however, a new impetus is given to the pulmonary arteries and to the lungs, at the expense of the branchial arteries and the gills: as the former develop, the latter decrease, till at last the branchial arteries and veins become obliterated, and the branchial apparatus entirely perishes, no trace of it remaining; while certain vessels which formed a junction between the branchial system of arteries and the pulmonie arteries, enlarge, and now add only to the pulmonic circulation. Thus the circulation in the

frog and newt changes, by a wonderful transition, from that of a fish to that of a perfect reptile; while in the proteus and its allies, it continues to be that of the fish, with the addition of a modified state of pulmonary circulation, approaching that of the perfect reptile structure. As our aim is not to enter into minute anatomical details, we shall not pursue this subject: to have omitted all notice of it, however, would have been unpardonable. It is in these curious and interesting phenomena, that we behold exemplified so clearly and forcibly the "wisdom of God in creation." Here the atheist is at once confounded, while the man of science and piety recognizes with pure delight the power and superintending care of Him, who made "every creeping thing," and who has laid his works before us, that while we admire them, we may glorify his name.

Reptiles have either four limbs, two, or none; the ribs are sometimes very numerous, sometimes wanting; there is no true distinction between the chest and abdomen, no diaphragm or muscular expansion, dividing, as in quadrupeds, these two cavities. As the blood is of a low temperature, these animals need neither fur nor feathers, for the retention of the vital heat: they are therefore covered either with horny plates, or with scales, or have the skin entirely naked. They possess the senses of hearing, sight, taste, smell, and touch. Their sight is in general extremely acute; for on this sense depends their pursuit of food, and their perception of the approach of enemies. In some few, however, as the proteus, which inhabits subterraneous waters, the eye is extremely minute, appearing like a black dot, covered by the transparent skin, and is in a rudimentary condition. The senses of taste, smell, and touch in reptiles are comparatively feeble. With regard to hearing, there appears to be considerable variation in different groups. In serpents, this sense is very acute, and these animals evidently derive pleasure from musical notes, as is well known to the serpent charmers of the east. In lizards,

also, the sense of hearing appears to be quick; but in tortoises and in the amphibia, it is probably much more obtuse. In most cases, the internal organs of hearing are entirely covered by the scaly investinent of the head, or by the naked skin: in lizards generally, the tympanic or drumlike membrane is stretched over the external orifice of the ear, and is on a level with the scaly covering of the rest of the head; but in the crocodile, the external orifice, instead of being thus permanently closed, is provided with a firm, hard, movable lid, or operculum, by means of which the aperture may be either stopped or kept open. Thus while basking on the margin of the river, or lying there in ambush for prey, the crocodile has the power of raising the earlid, in order to listen attentively to every noise; but when he dives beneath the water, either for safety, or to drown the victim he has seized, the entrance of water into the auditory cavities is prevented by the firm shutting of the lid, which accurately fits the orifice. Reptiles are ordinarily oviparous: \* they bury their eggs in the sand, deposit them in warm places of concealment, or leave them floating on the water, exposed to the rays of the sun: in due time, the young are hatched. In some few instances, the eggs are hatched immediately previous to their exclusion, as in the case of the viper, and the young are taken under the mother's protection.

By way of review, we may thus recapitulate, in a succinct manner, the above remarks, and at the same time give in brief the general characters of the present class.

Reptiles are cold and red-blooded vertebrate animals, with a heart consisting essentially of two auricles and one ventricle: there are always true lungs, but in one tribe, the amphibia, which commence their active state of existence as aquatic beings in the form of a fish, there are also gills, which mostly perish as the lungs develop, but not always; some groups having permanent gills, as well as lungs: all are oviparous. The bodies of the reptilia

\* *Ovum*; an egg; *paro*, to produce.

are either covered with horny plates or scales, spires, or granules; or, as in the ordinary amphibia, with a skin entirely naked. There is either no external organ of hearing, or only a simple orifice, open in some, in others covered by a transparent tympanic membrane; and in a few, with a moveable valve. The number of the limbs never exceeds four; some groups are destitute of limbs, the ribs greatly assisting in terrestrial locomotion. Most reptiles are carnivorous: some, however, (and these belong to the first group, namely, the tortoises,) are vegetable feeders; a few feed both on small animals, as slugs, insects, etc., and on leaves and fruits. An extensive division of one order presents us with creatures formidable from the possession of poison fangs, death rapidly following their bite.

We shall divide the reptilia into the following orders:—

Class REPTILIA. (*Repto*, to creep along.)

Order I. *Chelonia*—Tortoises, (Χελωνη, *cheloné*, a tortoise.)

— II. *Sauria*—Crocodiles, Lizards, etc., (Σαῦρος, *sauros*, a lizard.)

— III. *Ophidia*—Snakes, (Οφίς, *ophis*, a snake.)

— IV. *Amphibia*—Frogs, Newts, Proteus, (Ἀμφίβιος, *amphibios*, having a life of both kinds.)

These orders are well defined; nevertheless, they pass into each other by certain gradations of form, which, indeed, are more evidently traceable between two of the orders, namely, Sauria and Ophidia, than between these and the two others, but which are still to be recognised even here. Of the Chelonia, or tortoises, for example, the serpentine water-tortoise, *Emysaurus serpentinus*, Bibr. (*Chelydra lacertina*, Schweigg.) seems to approach the Saurian order in many particulars; or rather, perhaps, the extinct group, termed *Enaliosaurians*\* by Conybeare, in which are included the gigantic fossil reptiles, the ichthyosauri and plesiosauri; and which

\* *Εναλίος*, (*enalios*,) marine; *σαῦρος*, (*sauros*,) a lizard.

probably constituted a link intermediate between the tortoises and crocodiles. The Saurian order passes, by very marked steps, into that of the snakes; the genera *Scincus*, *Seps*, *Bipes*, *Pygopus*, and others, on the part of the former, merging into the genera *Pseudopus*, *Ophisaurus*, and *Anguis*, (slow-worm,) on the part of the latter; and thus, by gentle transitions, are the snakes and lizards united. The passage from the snakes to the Amphibia is less distinct. Perhaps, however, an intermediate link may be found in the genus *Cæcilia*. This genus Cuvier retains within the pale of the Ophidia; but observes, that many naturalists consider it as belonging to the Amphibia, (*Batraciens*,) “although we know not whether it undergoes a metamorphosis, or the contrary.” If Müller be correct, however, it would seem that there are branchiæ at an early period, which are ultimately lost. With the elongated form of a snake, the animals of this singular genus, *Cæcilia*, have the skin smooth, viscous, and marked with a series of annular or ring-like depressions. It appears to be naked, but on a careful examination minute scales are found in its substance, and disposed between its folds in regular rows. The eyes are very small, almost concealed beneath the skin, and in one instance (*Cæcilia lumbricoides*, or the worm-like *Cæcilia*) they are wanting. It is from the rudimentary condition of the eyes, that the genus derives its name, *cæcus*, in Latin meaning blind. The form of the head is depressed, the ribs are too short to encircle the body, as they do in snakes generally; and what is still more remarkable, the vertebræ are articulated to each other by facets, hollowed out and filled with a gelatinous cartilage, as in fishes, and some of the lowest of the amphibious order. The skull is joined to the first vertebra by two condyles; whereas, in serpents it is joined by one only. Professor Bell, who considers the Amphibia to form a distinct class from the Reptilia, gives the *Cæcilia* as the example of an order termed Apoda, and which concludes the series of the Amphibia; and, in like



manner, Dr. Fleming closes with the Cæcilia, the batrachian section of the reptiles; observing, that the absence of scales, the cup-shaped vertebræ, the shortness of the ribs, and the simplicity of the heart, intimate that this genus should not, as heretofore, be included among the serpents.

If the existence of branchiæ, or gills, in the Cæcilia, at an early period of life be, as Müller asserts, the fact, we have at once positive grounds for regarding it as forming part of the Amphibia; while, perhaps, it links these with the Ophidia, or serpents.

The passage of the Amphibia into the fishes is very palpable. It is interesting to see by what insensible gradations the former merge into the latter, through the amphiuma, the axolotl, the menobranchius, the proteus, the siren, and the lepidosiren. The animals of the latter genus, of which two species are known, one a native of the Amazon, (*L. paradoxa*,) the other of the Gambia, (*L. annectans*,) are so intermediate in form and structure between a reptile and a fish, though they possess lungs as well as branchiæ, that it is difficult to know where to place them. Dr. Natterer regards them as Amphibia; Professor Owen as fishes, on the grounds that the characters of the latter predominate. The engraving of *Lepidosiren annectans*, will serve to illustrate the justice of our observations.

The transitions, by regular gradations, from group to group, which the naturalist continually meets with in his investigations of nature, afford pleasing proofs of the harmony and order of the plan of creation; they betoken the oneness of a great scheme, wisely arranged, and of which the parts link all together, and thus they demonstrate that nothing came into being by that kind of chance, that fortuitous concurrence of circumstances, that assumption of organization by matter previously inert, which those writers suppose, who contend for the baseless theory of spontaneous or equivocal productions. Granting that laws tending to such a production were,

as they would tell us, stamped by the Almighty on matter, harmony would be perpetually violated, the whole of animate creation would present us with a multitude of jarring and discordant parts; and the naturalist would have to relinquish in despair, the hope of obtaining a glimpse of the great plan of creation, the grand scheme by which the whole is blended into unity; for plan and unity would exist only in his imagination. But it is not so, for nature herself proclaims the hand of her Divine Original, and throughout her vast domains shows to us God in his power, wisdom, and goodness.

Having thus briefly detailed the general and common characters of the class, Reptilia, and enumerated the orders into which it appears naturally to resolve itself, we shall proceed, without further preface, to enter upon our subject more at large, and treat each order in succession, trusting that the reader will find in the following pages information mingled with interest, and science relieved by a popular mode of presenting it. We aim only at a clear and correct outline, to serve as a guide to the investigation of the structure, habits, and manners of the living beings which the God of nature has created: an outline which may be filled up or enlarged, but which will be found in conformity with the present advanced state of natural history.

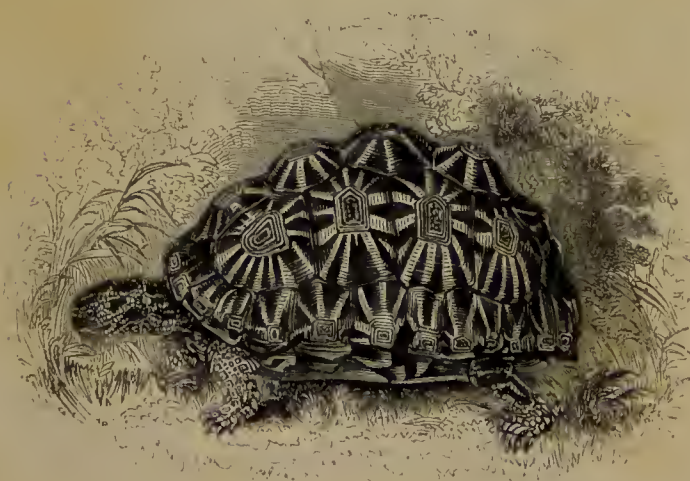
So far, then, have we attempted to give, by way of introduction, an outline of the characteristics and natural habits of the Reptiles, an extensive and remarkable group of the animal kingdom.

The particulars into which we have entered, curious in themselves and interesting to the intelligent mind, bespeak the wisdom of God in creation, who created "every thing that creepeth upon the earth after his kind" and "saw that it was good." He himself, in the book of Job, appeals to the leviathan, or crocodile as a proof of his power; a power manifested in the little lizards that sport on the sunny bank, and in the tremendous boa that spreads terror and destruction around.





GAMBIA LEPIDOSIREN.



GEOMETRIC TORTOISE.



So convincing are the proofs of a God of infinite power and wisdom, which the structure and characters of living creatures display, that the atheist, when he considers them, is overwhelmed with a sense of his own folly; and though he may say in his heart there is no God, cannot say so in his head; his depraved wishes, not his intellect, speak for him.

A study of the works of the creation leads us, then, immediately to God. The meanest creatures, as we call them, proclaim the hand of their Divine Original. Hence the science of natural history, in all its departments, is both a profitable, a gratifying, and a worthy object of our attention: it expands the mind, and opens to our reflection mysteries which must ever baffle the endeavours of our finite intellect to comprehend, and in which God glorifies himself, at the same time that he teaches us humility. It must be confessed, however, that the study of nature, though it enlarges our ideas of the power and wisdom of God, and tends to humble us, shows to us his glory as manifested only in creation; it gives us no information as to our condition before God, as to our hopes for eternity, as to our need of salvation, and the way of our obtaining it. But here, happily, where the light of nature fails, the light of revelation beams gloriously upon us; its pure rays illuminating the path in which we should tread, and animating us to pursue it to the end.

When our first parents, in a state of innocence, surveyed with delight and astonishment the wonders of creation, God himself imparted to them a knowledge of his will, which no created beings around them could possibly have made known. When they fell through disobedience, entailing the curse upon their posterity, labour, and sorrow, and death, it was God himself, who with reference to the Messiah, revealed to them, as a dispensation of mercy, that the Seed of the woman should bruise the serpent's head; though it should bruise his heel. Of the Messiah, thus shadowed forth

in this promise, the sacrifice of the believing Abel was a type, a firstling of the flock; emblematical of the "Lamb that was slain," as a sacrifice for the sins of the world.

God, again, in the Mosaic dispensation, gave to the Israelites a system which the light of nature could never reveal, a system of sacrifices and ceremonies; while by the mouth of prophets, he spoke more fully and clearly of the Messiah, the Redeemer of the world.

The promises and prophecies have been fulfilled, the Day-spring from on high hath visited us; Christ, the Messiah of the prophets, who "thought it not robbery to be equal with God," "was made in the likeness of man," and suffered death upon the cross, and bore "our sins in his own body on the tree." All who thus believe in him have eternal life. The promise of pardon through the blood of Christ, is made to all who unfeignedly believe. In this atonement for sin, a revelation is made of the purposes and mercy of God towards fallen man. These purposes, this mercy, the light of science fails to disclose. We may examine and re-examine the forms and structures of living creatures, where indeed we read in visible characters the power and the wisdom of God in creation; but it is for revelation alone to make known unto us the way of salvation, to convince us of the mercy of God to a ruined world, and to prove to us how mercy and justice are reconciled in the atonement Christ made for sin. To this atonement we must be led, not by the light of science, but by the Spirit of God, whose gracious influences will not be sought in vain.

Diverse, then, in their influence upon us, and in the views they display, are the light of science, and the light of revelation. The one impresses us with exalted conceptions of God, as an eternal, all-powerful, all-wise Being; the other leads us to know our own lost state by nature, the mercy of God in providing a ransom, and opening to us the way unto eternal life.

To some of our readers this digression will not be distasteful. To those who condemn it, as utterly out of

place, we would say, that while desirous of giving to the public, works upon scientific subjects, leading the reflective mind to trace the power of God in creation, the great aim of the Society that publishes this volume is to enforce the truths of revelation. Nor should it be deemed out of place to speak of the mercy, in redemption, of that God whom we behold in creation, and which he has provided for man; who above the beasts that perish, is the possessor of an immortal soul, and accountable at that bar where Divine revelation assures us we must all one day stand, Rom. xiv. 10; 2 Cor. v. 10.

## ORDER I.—CHELONIA, OR TORTOISES.

THE TORTOISES, which form the first order of Reptiles, are too remarkable in their external character to be confounded with any other. Like the armadilloes and pangolins, among the mammalia, they are clothed with natural armour; but it differs from the armour of the mammalia referred to, inasmuch as it is not a simple horny addition to the skin, but is, in reality, part and parcel of the skeleton itself. The skeleton, in fact, is thrown to the outside of the body, so as to form an external bony envelope, covered with a horny or leathery sheathing, and inclosing, as in a box, the internal organs and other portions of the osseous frame-work, which do not enter immediately into its composition.

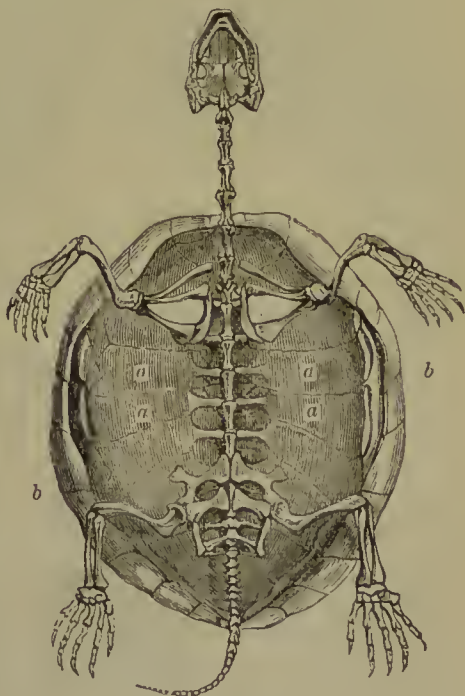
If we examine a common Tortoise, we shall find the shell, as it is termed, or more properly, the horn-sheathed osseous box, from which its head, limbs, and tail emerge, to consist of a vaulted portion, or buckler, covering the back; and an abdominal portion joined to the former, along the sides: the back plate, or dorsal buckler, is termed the carapace, (*clypeus*,) and consists of the vertebræ of the back and loins, and also of the ribs. The dorsal vertebræ, or those of the back, are not only immovable, but are strangely modified. The bodies being but little developed, while the superior spinous processes are converted into a series of broad osseous plates running along the centre of the carapace, and connected together by sutures, like the bones of the human skull; the ribs, again, are changed into flat expanded bones, all united firmly together, and also to the edges of the flattened spinous processes, the whole forming a consolidated plate. To the margin of the plate thus formed, is added

a third set of bones, regarded, and perhaps correctly, as representing the sternal ribs of the crocodile and other lizards: these bones are united to the extremities of the expanded ribs, and form the circumference of the carapace, which they assist in completing. From their character and situation they may be termed the costo-sternal plates, (*costa* a rib, *sternum* the breast-bone).

The annexed sketch of the skeleton, and under surface, of the carapace of the European Marsh Tortoise, (*Cistudo Europæa*), will serve to show the structural peculiarities described. The vertebral column, the bones of the pelvis and of the limbs, are very evident, as are also the expanded ribs, *a, a*, and the sternal ribs, or costo-sternal plates, *b, b*.

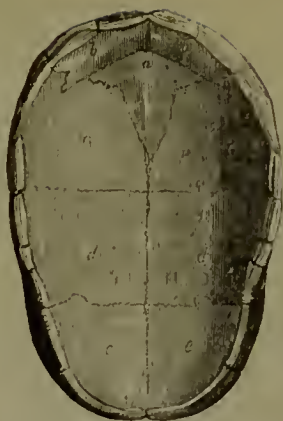
The abdominal buckler is termed the plastron,

(*sternum*), and consists of nine osseous portions, of which eight are in pairs; the ninth is single, and occupies the anterior part of the plastron. The form of the plastron varies remarkably in the different species; generally, however, the single plate is surrounded by the first two pairs of bones, as in the following sketch; *a* representing this single portion. The distinct plates forming the





plastron are thus denominated by M. Geoffrey : *a*, the entosternal bone, (bone with in the sternum ;) *b, b*, the episternal bones, (bone upon the sternum ;) *c, c*, the hyosternal bones, (the middle bones ;) *d, d*, the hyposternal bones, (substernal bones ;) *e, e*, the xiphisternal bones, (swordbones of sternum,) answering to the xiphoid cartilage of the sternum in mammalia.



PLASTRON OF EUROPEAN CISTUDO, VIEWED  
ON ITS INNER SURFACE.

The osseous portion of the plastron of a very different group of Tortoises is here figured ; it shows how great is the extent of variation to which the bones composing it are subject. It is, in-

deed, principally in terrestrial Tortoises, and in the marsh Tortoises, though less completely in the latter, that the plastron forms a solid, compact whole ; in the river Tortoises, and those which inhabit the sea, and usually named turtles, the anterior and

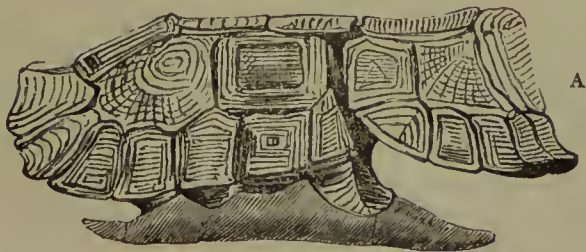


posterior bones are slender and narrow, while the lateral bones are broader, and branch out into dentated projections, resembling, in some degree, the antlers of the elk, or fallow deer. In the river Tortoises, the centre, as in the preceding figure, is not ossified.

As it is in the Tortoises of terrestrial habits that the



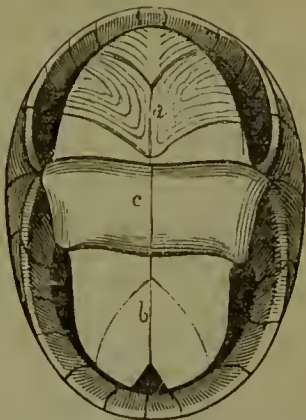
plastron presents the greatest solidity, so it is in these animals that it presents some of the most remarkable differential characteristics. Its union to the carapace is by an extensive lateral surface; and at this line of union it is sometimes slightly moveable, but mostly fixed by an unyielding suture. Its anterior and posterior margins are generally indented or notched, for the more free egress of the neck and the tail. Sometimes, however, they are simply truncate, or, on the contrary, prolonged into a point. In one genus, however, the plastron is furnished with a transverse hinge, giving mobility to the anterior portion; so that the animals can retract their head and fore limbs within the carapace, and close the plastron upon it, so as to shut them in. These species constitute the genus *Pyxis*. There is, however, another genus in which the carapace, instead of being one solid whole, has the posterior portion distinct from the anterior and moveable, so as to close upon the hinder margin of the plastron, and shut in the hinder limbs and tail. This genus is termed *Cinixys*. The annexed figure represents the shell: A is the moveable portion of the carapace.



SHELL OF CINIXYS

In the marsh Tortoises, which resemble the terrestrial Tortoises in the general construction and union of the plastron, there are genera which have this abdominal shield also furnished with transverse hinges. In the genus *Cinosternon*, the plastron has two moveable valves,

one anterior, the other posterior, hinged on an intermediate fixed piece, as in the annexed outline; so that the animal can shut itself completely in: *a*, the anterior mobile portion; *b*, the posterior; *c*, the middle fixed portion. In the genus *Cistudo*, there is only one hinge dividing the plastron into two moveable parts: in the genus *Sternotherus*, the anterior part only of the plastron is moveable.



PLASTRON OF CINOSTERNON.

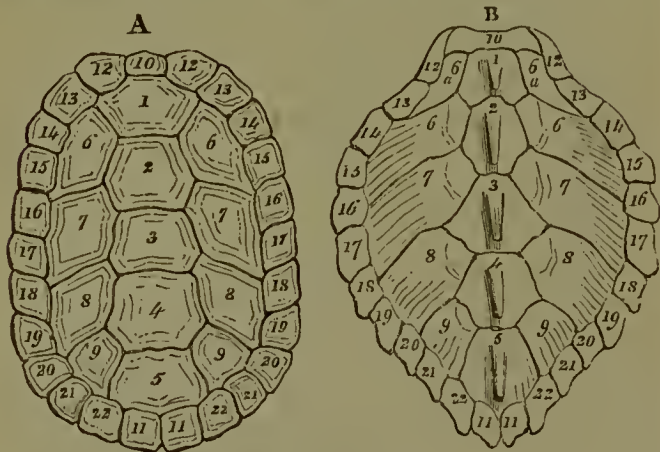
In the Matamata, (*Chelys matumata*,) the plastron is narrow, elongated, and firmly consolidated to the costal or rib plates of the carapace. In the *Emysaurus serpentinus*, the plastron does not form a complete covering to the abdomen: it is narrow and terminates anteriorly in a point, which is enveloped in the skin, but its middle portion extends to meet on each side the edge of the carapace. In the river Tortoises, as the Trionyx, (*Gymnopus*, Bibron,) the osseous part of the plastron is imperfectly developed, and is bordered all round by a tough leathery skin, which unites it to a similar skin bordering the imperfect carapace. In marine Tortoises, or Turtles, the plastron is united to the edges of the carapace by intervening cartilage, and not by suture. We might here proceed to the enumeration of many other modifications of form which the plastron exhibits, but we have said enough to show the general extent to which it varies. In like manner the carapace exhibits numerous variations of form and degrees of development, from the dense and solid structure of the land Tortoises, to the restricted expansion of its component parts in the Matamata, or in the common Turtle; from a vaulted figure to a flat,

or nearly flat, expanse, and through different grades of solidity. Suffice it to say, that in the land Tortoises it is the strongest, the most arched, and the most completely developed; and that in these it constitutes a solid protection, which no ordinary pressure can break. We have said that both the carapace and the plastron are sheathed externally with horny plates; these are differently arranged; sometimes they overlay each other, like great scales, as in the Hawk's-bill Turtle, (*Chelonia imbricata*.) The plates of this animal are valuable in a commercial point of view, constituting what is commonly called tortoise-shell. Generally, however, the plates are merely laid on the bone, and touch each other only at their edges; they vary in form, and in the direction of the raised lines, and intervening furrows with which their surface is ornamented. It is almost unnecessary to say, that these horny epidermic plates, (upon the skin, *επι, epi*, upon; *δερμα, derma*, the skin,) are the result of a process of secretion regularly carried on; and when one is removed during the life of the animal, it is gradually reproduced. To a certain extent these plates correspond to the bones composing the carapace and plastron, but not entirely; they do not terminate along the line of the different sutures, but pass over them; and indeed they seem by extending beyond the line where the bones unite, as if designed to add to their consolidation into one. The sketches on the next page will give a good idea of their ordinary arrangement: the numbers refer to the names by which naturalists distinguish them.

A. The carapace of the European Marsh Tortoise, or Emys.—B. The carapace of the Loggerhead Turtle, (*Chelonia caouana*.)—C. The plastron of the European Marsh Tortoise.—D. The plastron of the Loggerhead Turtle, (*Chelonia caouana*,) a marine species.

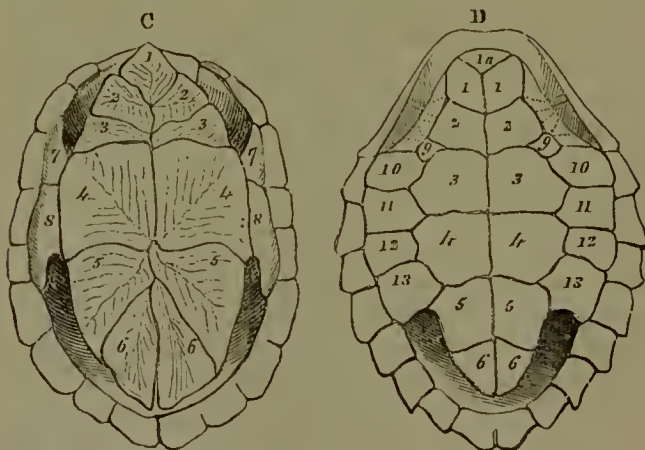
Figs. A and B.—1, 2, 3, 4, 5, the vertebral plates or scales; 6, 7, 8, 9, the costal plates; 6, A, an additional costal plate, met with in some marine turtles; 10, the nuchal plate; 11, the caudal plate, sometimes single

sometimes double; 12, the anterior marginal, or marginal neck plates; 13, 14, the marginal arm plates; 15, 16,



FIGURES A AND B.

17, 18, 19, the marginal side plates; 20, 21, 22, the marginal thigh plates.



FIGURES C AND D.

Figs. c and D.—1, The gular or throat plate, sometimes

single, sometimes double; 1 *a*, the intergular plate. This when present, is situated sometimes before, sometimes behind, the gular plates; 2, the humeral plates; 3, the pectoral plates; 4, the abdominal plates; 5, the femoral plates; 6, the subcaudal plates; 7, the axillary plates; 8, the inguinal plates; 9, 10, 11, 12, 13, the sternolateral plates, which are present only in marine Turtles.

Having thus explained the nature of the carapace and plastron, and of the scales or plates which form an external covering to the consolidated spine, ribs, and sternum, of which these parts are actually composed, we may proceed to notice the manner in which respiration is effected; as it is, in a great measure, by the action of these parts, namely, the ribs and sternum, in mammalia, that the lungs become filled with air. Mammalia, for example, breathe by expanding the cavity of the chest occupied by the lungs, into which, accordingly, the air enters, through the trachea, or windpipe, to fill up the vacuum occasioned by the dilatation of the cavity. Now, this action, as is very manifest, supposes a certain degree of mobility in the walls of the chest, or, in other words, of the ribs and sternum which encircle it, independently of the action of the great muscle of respiration, or diaphragm, which parts the chest from the abdominal cavity. In Tortoises, the walls of the chest are, as we have shown, immoveable, they cannot be expanded, the bones are all locked into one solid mass; and there is no muscular diaphragm, parting the cavity occupied by the heart and lungs, from that containing the rest of the viscera. There must, therefore, be some peculiar mechanism, by which the lungs become filled. The fact is, that the air is forced by the action of the tongue and mouth, through the trachea into the lungs, by an act resembling deglutition, or rather, in the manner in which the ball, or hollow butt, of an air-gun is charged by repeated strokes of the piston.

The jaws being firmly closed, the cavity of the mouth



is enlarged by the drawing down of the root of the tongue and of the hyoid bone\* which supports it, and the air at the same time rushes into the mouth through the nostrils. The free part of the tongue is now applied to the posterior orifices of the nostrils, so as to stop them, as though by a valve; the gullet, also, is now closed, the root of the tongue is elevated, the broad muscles of the throat contract, and the air is forced down the windpipe into the lungs; which become filled by a repetition of the process. The breathing out, or expiration of the air, is effected by the simple pressure of the abdominal and other muscles within the plastron and carapace. It is in this manner that the Amphibia, which have no ribs, also respire, as the frog, and toad, etc. The lungs of Tortoises are of ample volume; they are two in number, and are placed immediately beneath the carapace, and above the rest of the viscera. To the aquatic species, in particular, the dorsal situation of the lungs is of great advantage; these organs act as a float, and enable the animals to retain their due position among the roughest waves: for it must be very evident, that the part containing voluminous lungs filled with air, will be always uppermost in the water.

The jaws of Tortoises are not armed with teeth, but are cased in horny coverings, resembling the sharp, hooked beak of a parrot, with which they crop and mince the vegetable aliment on which they feed. In some species, as the *Trionyx*, around the outside of this beak are thick fleshy lips; the food consists of small living animals, as amphibia, young birds, reptiles, etc. In the Matamoras the jaws which open very wide, instead of being armed with a strong beak, are protected with a sheath of horn so delicate, that most naturalists have overlooked it, and Cuvier states that the mouth of this Tortoise resembles that of the *Rana pipa*. We select

\* *Os hyoides*, so called from resembling the Greek letter  $\upsilon$ ; it supports the roof of the tongue.

three heads to show the difference in the characters of the jaws. 1, a species of marine Turtle; 2, the *Trionyx ferox*, (*Gymnopus spiniferus*, Bibron;) 3, the Matamata.



Notwithstanding the horny beak with which the jaws of Tortoises in general are furnished, the sense of taste is decidedly higher in these than in other reptiles. The tongue is thick, fleshy, very moveable, and composed of numerous muscles; nevertheless, it is not capable of being protruded from the mouth, the cavity of which it fills: it is provided with salivary glands and nerves of taste. In the terrestrial Tortoises, in which the sense of taste is most perfect, its surface is thickly covered with papillæ; in the marine species, however, it is smooth; in other aquatic groups, its surface is more or less furrowed, and especially in those which inhabit marshes.

The eyes of Tortoises resemble, in many respects, those of birds. There are always three eyelids; two are external, continued from the common skin of the head, and vary in form in different genera: one is internal, and resembles the *membrana nictitans* of birds; it is moved by muscles destined to that office. With regard to the sense of smell, it appears to be at a low degree; the internal olfactory apparatus occupying but a very limited space. The nostrils open on the most anterior part of the upper mandible, and are close to each other. In the fluvatile, (*fluvium*, a river,) or river species, and in the Matamata, (see the preceding figure,) the nostrils are prolonged into a sort of flexible proboscis, which the animals can raise for the purpose of respiration, between the large floating leaves of aquatic plants, while they lurk with their bodies concealed below them, and immersed in the water, there

lying in wait for small birds, fishes, or frogs, on which they dart, and which constitute their food.

As Tortoises are mute, or utter but an indistinct noise, the sense of hearing cannot be expected to be very acute: the internal auditory apparatus, is, in fact, extremely simple, and there is neither an external tympanum, nor any orifice; in the Matamata, however, (see preceding fig. 3,) there is a sort of triangular prolongation, formed by the integument of the skull, and which seems to act as a valve to the orifice of an osseous auditory canal, and which widens outwardly; in the interior of this is a frame, on which the skin is stretched, so as to perform the office of a tympanum.

From the preceding survey of the general characteristics of the Chelonia, we shall now descend to an examination of those structural peculiarities, which lead to a subdivision of the order into natural families; and in so doing, we lay the foundation of a correct knowledge of the strange and interesting group under examination.

In the first place, then, we direct our attention to the limbs, or locomotive organs of the Chelonia; which, in their general form, and in the arrangement and condition of the toes terminating them, furnish, as in other races of vertebrate animals, a clue to habits and modes of life.

At a cursory survey, we at once perceive that a large group presents itself, in which the toes are so enveloped in the skin, that their independent mobility is either impossible, or very limited. The feet, in fact, resemble mere stumps, or rather, perhaps, those of the elephant, with this difference, that the toes are still less distinct and free, and the soles less soft and elastic; while the animals in their slow, laboured, and crawling progress, do not put the whole of the sole to the ground, but only the edge of the sole, furnished with horny lamina, tubercles, or hoof-like nails, and which indicate the situation of the ultimate joint of each of the toes. (See the annexed sketches.)

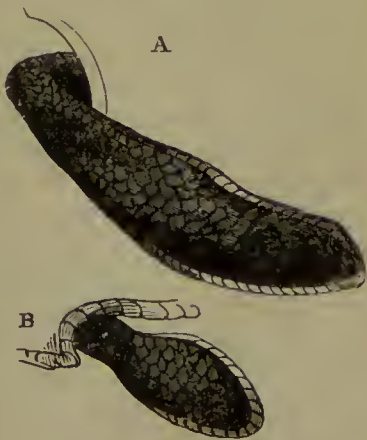
Such is the structure of the feet in the first family



of the Chelonia, namely, the true land Tortoises; and it is their primary characteristic; to which it may be added, that their carapace is boldly vaulted, its elevation often equalling its breadth. Another group presents itself, distinguished also by an immobility of the toes, or phalanges, as great as in the terrestrial Tortoises. Here, however, we find a very different modification of the feet; such, indeed, as would render them almost useless as organs of progression on the ground, but which, a moment's inspection assures us, must fit them admirably for aquatic progression, and for contending with the roughest waves. In short, we see them depressed, flattened, enlarged, and fashioned as oars. Limbs thus modified, are exclusively characteristic of marine Tortoises; animals which live far out in the wide ocean, and which only approach the shore for the purpose of depositing their eggs; and there, their progression is slow and awkward in the extreme. The limbs are of unequal length, and so utterly incapable are they of being applied firmly to the ground, that when the animals are turned upon their back on the sand, they cannot recover their natural position, or they find the utmost difficulty in the effort. In these marine Tortoises, or Turtles, which



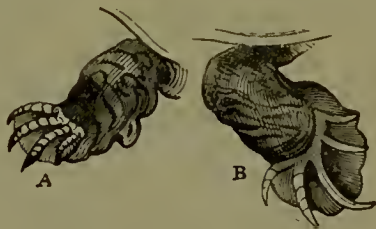
THE ANTERIOR AND POSTERIOR LIMBS OF A SPECIES OF LAND TORTOISE. A, ANTERIOR. B, POSTERIOR.



ANTERIOR AND POSTERIOR FLIPPERS OF CORYCÆUS FURLE. A, ANTERIOR. B, POSTERIOR.

generally attain to large dimensions, the carapace is very broad, more or less depressed, and of a somewhat heart-shaped outline. We give the anterior and posterior flippers of the Leathery Turtle, (*Spargis coriacea*.)

Thus, then, we have two very distinct groups, one terrestrial, the other marine. But if we look again more narrowly, we shall find a number of Tortoises, which cannot be referred to either of these groups: the toes so far from being completely buried, are apparent externally, and moveable, but are united to each other by means of an intervening web, of greater or less extent, as in the annexed figures. These feet are adapted either for the land or for water; and, accordingly, Tortoises thus distinguished are sometimes found on the land, usually in marshy places, or in water, and are more aquatic in proportion to the development of the webs. Some species, indeed, seldom come to land; but it is fresh water which they inhabit, and not the sea.



A. ANTERIOR FOOT. B, POSTERIOR.

These web-footed, or fresh-water Tortoises, however, do not form one, but two natural families, distinguished from each other both by their general structure and their habits. In one family, and that the least numerous, the jaws, the bones of which are almost denuded, are covered by a fold of skin, which fulfils the office of true fleshy lips. The plastron and carapace are not sheathed with horn, but covered with a smooth, naked, coriaceous, or leathery skin. The body is singularly depressed, and the circumference of it is generally soft and flexible. The plastron is joined to the carapace by a cartilage; the feet are greatly flattened, and are furnished with five toes, of which three only are armed with straight and hard nails; from this circumstance, they have derived

the name of *Trionyx*. All the known species live in the great rivers of the hotter latitudes of the globe, and may be, therefore, designated as fluvial, or river Tortoises. They are fierce and carnivorous.

The other web-footed family is characterized by the toes being distinct and moveable, and all armed with nails, instead of only three. The jaws are invested with a horny beak, and are destitute of fleshy lips. The feet are well adapted for terrestrial progression; but still more so for swimming, from the existence of intervening webs. All the species live both on the land and in the water, giving preference to humid places, to boggy lands and marshes, or to the margin of small streams; and they dive and swim with great facility. To this family may be given the name of Marsh Tortoises, or *Emydes*.

But the *Emydes*, or Marsh Tortoises, subdivide themselves into two minor groups; one distinguished by the conical figure of the head, the elevation of its upper surface, the lateral position of the eyes, and by the cylindrical form of the neck, which is invested in loose skin, constituting a sort of sheath to the head when withdrawn beneath the carapace, of which it then occupies the centre of the anterior portion; the neck being folded like the letter z. This section approaches the nearest to the terrestrial Tortoises.

The second group is distinguished by the depressed contour of the head, and by the position of the eyes; these, instead of being lateral, are placed on the upper part of the head, and have often a vertical aspect. The interval between the carapace and plastron has a great lateral extent; and the neck, which is elongated and covered with close skin, destitute of folds, is bent to one side, to enable the animals to conceal the head beneath the carapace. MM. Dumeril and Bibron term the first group *Cryptodera*, from *κρυπτος*, (*cryptos*,) concealed, and *δειρη*, (*deiré*,) the neck; the second group, *Pleurodera*, from *πλευρον*, (*pleuron*,) the side, and *δειρη*, (*deiré*,) the neck.

The arrangement of the Chelonia may be anticipated from what we have said ; they are naturally divided into the following families :—

- I. Terrestrial, or Land Tortoises.
- II. Marsh Tortoises, or Emydes, (Cryptodera, Pleurodera.)
- III. Fluviate, or River Tortoises.
- IV. Marine Tortoises, or Turtles

### TERRESTRIAL TORTOISES.

TORTOISES have been long celebrated for their slow and awkward pace. They drag themselves along apparently with great effort, and after many exertions make but little progress. In their natural state, they lead a quiet, unobtrusive life, and wander in general but little from the spot where their existence commenced. While the rapid snake darts onward, swift as an arrow, either in pursuit of prey, or in order to escape from a more powerful foe ; while the quick-eyed lizard glances by, scarce seen as he passes, the Tortoise creeps along, and unable to escape by speed from danger, withdraws his head and limbs within his panoply of defence on the approach of an enemy, and bids defiance to his assailant. The utility of strong natural armour to these slow creatures, living in regions where the strongest and most ferocious of animals abound, and to the attacks of which they are liable, must be evident : they cannot oppose force to force, they cannot flee from danger ; but thus protected, they can wait in security till their enemy retires. The density both of the carapace and plastron of the terrestrial Tortoises is, indeed, very considerable ; and the former, from its elevation and convexity, is capable of sustaining uninjured a high degree of pressure ; thus acting as a defence to the internal organs. The plates of horn with which it is covered are often most elegantly marked with alternate raised lines and furrows, and at the same time beautifully

coloured. These plates, however, are too thin to be of use in the arts, as are the scales of the Hawk's-bill Turtle.

As may be expected in animals with cold blood and a languid circulation, Tortoises (and the observation applies to the whole class) are remarkable for tenacity of life: they bear severe injuries not only without the loss of life, but without much apparent suffering; and even when the head is cut off, they will crawl about for several days; and long afterwards the muscles will contract upon the application of stimuli.

Terrestrial Tortoises, though they never enter the water, are very frequently met with in the neighbourhood of rivers or lakes. In such localities, vegetation is luxuriant, and the soil moist or soft; the latter circumstance being by no means unimportant; for they dig in the earth burrows or holes, but of no great depth, in which during the winter season, at least in extra-tropical latitudes, they bury themselves, and remain in a state of torpidity till the return of spring. It is, also, in holes which they dig, that the females deposit their eggs, which are then covered up and left, the warmth of the sun being sufficient to bring them to maturity: neither the eggs, nor the young when hatched, are objects of solicitude to the parents.

The eggs are generally spherical, and covered with a calcareous shell of considerable firmness: some species, however, deposit elongated eggs; and others, eggs larger at one end than another, resembling those of a bird.

The form of the young animals after exclusion from the egg, is very different to that of the species when fully grown. The carapace, for example, even in Tortoises distinguished when adult by its elongated form, is almost hemispherical, and is always destitute of protuberances, which in many cases are characteristic of the species. It is remarkable that, like young chickens, Tortoises before being hatched have a hard tubercle at the end of the beak, for the purpose, it is presumed, of breaking the shell in which they are imprisoned.



We have said that Tortoises are extremely tenacious of life; we may add, that their natural duration of existence is very protracted. We do not, indeed, know the period at which, according to the laws of their physical system, they cease to live in their native regions; but we know, that even in our uncongenial climate, instances are on record, of Tortoises attaining to what, compared with the life of man and quadrupeds in general, may be termed a very great age. In the Bishop's Garden, at Peterborough, a Tortoise died in 1821, which must have exceeded 220 years of age. The Lambeth Tortoise, which was introduced into the garden in the time of archbishop Laud, about the year 1625, died from some neglect on the part of the gardener in 1753, having been in the garden 128 years. Gilbert White records several details of one which had lived thirty years in captivity, and states that another in an adjacent village was kept, "till by tradition it was supposed to be 100 years old." Several other instances of the longevity of the Tortoise are on record. In the gardens of the Zoological Society, we have seen several specimens of huge Indian Tortoises weighing upwards of 400 pounds, and their age has been estimated at not less than 200 years, which is probably below the truth, since their size when first hatched from the egg is small, and their growth slow.\*

The food of terrestrial Tortoises is essentially vegetable, but earth-worms are said to be occasionally devoured. The numerous specimens which we have seen in the gardens of the Zoological Society, and elsewhere, have been fed with lettuce, cabbage, and other culinary herbs, together with various kinds of gourds. The Indian Tortoises seemed most partial to the latter: grass was

\* In the *Zool. Proceedings*, 1835, p. 54, in some notes by Sir R. Heron, Bart., extracted from his journal, we find the following:—

"1827. Mr. Reid, near York, has two water Tortoises brought over from the seige of Belleisle, which commenced in 1761; one of them having wandered, was missing for sixteen years, when it was found on cleansing out another pond. Both are alive, and very tame." In 1827, therefore, they had been about sixty-six years in England.

also freely eaten. Messrs. Dumeril and Bibron state that, in the botanical garden of Toulon, a large Indian Tortoise existed, which was observed to give preference to a sort of gourd or calabash of extreme bitterness, but we do not know whether or not this taste for bitters is peculiar to the species. Murray, in his "Experimental Researches," in allusion to the Peterborough Tortoise, gives us the following interesting particulars:—"From a document belonging to the archives of the cathedral, called the "Bishops' Barn," it is well ascertained that the Tortoise at Peterborough must have been about 220 years old. Bishop Marsh's predecessor in the see of Peterborough had remembered it above sixty years, and could recognise no visible change. He was the seventh bishop who had worn the mitre during its sojourn there. Its shell was perforated, in order to attach it to a tree, and to limit its ravages among the strawberry borders.

"The animal had its antipathies and predilections. It would eat endive, green peas, and even the leek, while it positively rejected asparagus, parsley, and spinage. In the early part of the season its favourite food was the flowers of the dandelion, (*Leontodon taraxacum*,) of which it would devour twenty at a meal, and lettuce, (*Lactuca sativa*:) of the latter a good-sized one at a time; but if placed between the lettuce and the flowers of the dandelion, it would forsake the former for the latter: it was also partial to the pulp of an orange, which it sucked greedily.

"About the latter end of June, (discerning the times and the seasons,) it looked out for fruit, when its former choice was forsaken. It ate currants, raspberries, pears, apples, peaches, nectarines, etc.; the riper the better, but would not taste cherries. Of fruits, the strawberry and gooseberry were the most esteemed: it made great havoc among the strawberry borders, and would take a pint of gooseberries at intervals. The gardener told me it knew him well, and would watch him attentively at the

gooseberry bush, where it was sure to take its station while he plucked the fruit.

“I could not get it to take the root of the dandelion, nor indeed any root I offered it, as that of the carrot, turnip, etc. All animal food was discarded, nor would it take any liquid, at least neither milk nor water; and when a leaf was moist, it would shake it to expel the adhering wet.

“This animal moved with apparent ease though pressed by a weight of eighteen stones: itself weighed thirteen pounds and a half. In cloudy weather it would scoop out a cavity, generally in a southern exposure, where it reposed torpid and inactive, until the genial influence of the sun roused it from its slumber. When in this state the eyes were closed, and the head and neck a little contracted, though not drawn within the shell. Its sense of smelling was so acute, that it was roused from its lethargy if any person approached, even at a distance of twelve feet.\*

“About the beginning of October, or the latter end of September, it began to immerse itself, and had for that purpose, for many years selected a particular angle of the garden. It entered in an inclined plane, excavating the earth in the manner of the mole; the depth to which it penetrated, varied with the character of the approaching season, being from one to two feet, according as the winter was mild or severe. It may be added, that for nearly a month prior to this entry into its dormitory, it refused all sustenance whatever. The animal emerged about the end of April, and remained for at least a fortnight before it ventured on taking any kind of food. Its skin was not perceptibly cold: its respiration, effected entirely through the nostrils, was languid. I visited the

\* We are not quite sure that it was by its sense of smell being affected, that the animal roused up at the approach of persons: and we have yet to learn that Tortoises are endowed with great delicacy in this respect. The nasal cavities are small, and separated from each other; the lining or pituitary membrane is usually black: it receives the ramifications of the olfactory nerves, and also a filament from the fifth pair of nerves.



animal for the last time on the 9th of June, 1813, during a thunder storm; it then lay under the shelter of a cauliflower, and apparently torpid."

It may be here observed, that both the appetite and the digestion of these animals are influenced by the temperature of the atmosphere; both are diminished by cold, and at all times, even when the temperature is most favourable, the process of digestion is slow; during hibernation it ceases altogether. Professor Bell states, that he has "known a Tortoise which had fed largely upon grass immediately before it became torpid, retain the grass unchanged in the stomach during the whole of the winter; so that, on opening the body after its death, which took place immediately on its awaking in the spring, and before it had any access to food, the stomach was found filled with a large quantity of grass wholly undigested." We can abundantly confirm Professor Bell's statement; instances of a like nature having, at different times, come under our own observation.

The manner in which the Tortoise feeds on leaves is very curious, and requires more assistance from the limbs than might be expected: the fact is, that these animals rather tear than cut off portions of the leaves on which they are regaling themselves; and in order to keep the vegetable steadily fixed, they place their fore feet upon it, and so press it to the ground; and when they have seized a portion between the mandibles, they separate it by drawing the head rapidly backwards. In like manner when burrowing they use the limbs with considerable address, scraping up the earth with the fore feet, and then shovelling it behind them with the posterior pair: their action, however, in this operation, as in eating, is slow and deliberate.

While speaking of the limbs of the terrestrial Tortoises, we may remark, that in every species, excepting in those of the limited genus *Homopus*, there are five claws or nails on each of the anterior feet, answering to the five concealed toes; but though the toes of the hinder limbs

are also five, the first four only are to be distinguished by nails; for the fifth toe is rudimentary, completely buried, and destitute of a terminal nail. In the genus *Homopus*\* there are only four nails on the anterior feet, as well as on the posterior.

The skin of the anterior part of the fore-limbs is usually covered with scales, or horny tubercles, of a larger size than those on the inner and posterior surface; but they vary considerably in shape and arrangement in the different species. The same observations apply, also, to the hinder limbs, but in many species the posterior part of the thigh, near the tail, is furnished with one or more elongated horny tubercles, and in others the heel is provided with flattened horny spurs, often exceeding the nails in size, but otherwise nearly resembling them. The tail, which varies greatly in form, is also covered with horny scales, or tubercles, imbedded in the skin; and the top of the head, from the upper mandible to the occiput, is protected with horny plates; a circumstance to be the more remarked, because among the marsh Tortoises some genera only have the head thus scale-clad; while the marine Tortoises, or Turtles, have both the surface of the head and the cheeks thus invested.

The terrestrial Tortoises are spread through the hotter and temperate parts of Asia, Africa, Europe, and America. None have been discovered in Australia.† In Europe, we possess three species, the Greek Tortoise, (*Testudo Græca*,) the Bordered Tortoise, (*T. marginata*,) and the Moorish Tortoise, (*T. Mauritanica*.) The latter two are, however, more common in Northern Africa, than in Eastern Europe. Africa produces nine species, of which three are also found in Madagascar, besides one species peculiar to this latter island. Six species are

\* ὁμοιος, (*homoios*,) like each other; and πους, (*pous*,) a foot.

† Two species only of the Chelonian order of reptiles are at present known as indigenous to Australia, and both belong to the marsh Tortoises; one is the *Platemys Macquaria*, the other the *Chelodina longicollis*. Mr. Gould has, however, recently brought several marsh Tortoises from Australia, of which some may be new.

Asiatic, and nine American, making a total of twenty-seven.

The genera into which the land Tortoises are divided, are as follow:—

- I. *Testudo*. Nails on fore-feet, five; carapace and plastron immoveable.
- II. *Homopus*. Nails on fore-feet, four; other characters as in *Testudo*.
- III. *Pyxis*. Anterior part of plastron moveable on a hinge; feet as in *Testudo*.
- IV. *Cinixys*. Posterior part of carapace not united to the anterior, and moveable; feet as in *Testudo*.

#### GENUS TESTUDO.

Of the genus *Testudo*, we may select as an example the common EUROPEAN TORTOISE, (*Testudo Græca*.) This species, which is often carried about in London, by Italians, for sale, inhabits a great extent of Southern Europe. It is abundant in Greece, Italy, and the larger islands of the Mediterranean. It is said to occur also in Spain and Portugal, and it exists in the South of France; not, however, as an aboriginal, but as a naturalized importation from Italy. It has been supposed to inhabit the northern borders of Africa, but this opinion has arisen from its having been confounded with the Moorish Tortoise, (*T. Mauritanica*,) which is a distinct species, and does not appear to live in the districts tenanted by the *T. Græca*.

The favourite abodes of the European Tortoise are sandy lands, covered with brushwood; and in certain districts it is abundant in such situations. These animals feed on herbage, roots, slugs, and earth-worms: they pass the winter in a state of torpidity, in holes which they themselves excavate, sometimes to the depth of two feet; these they enter in November, or the latter end of October, and do not re-appear till the latter end of April, or the beginning of May. Like most reptiles, they love

to bask in the rays of the sun. M. Bibron says, that in Sicily, where they are very common, it was always during the hottest part of the day that he met with them basking on the sides of the road, and often found their shell so heated, that he could not with comfort apply his hand to it. He adds, that he has often seen two males engaged in most desperate conflicts; they bite each other severely, especially about the neck; but the great aim is to turn each other over on the back: and when one of the party thus puts his rival "*hors de combat*," he hobbles away in triumph, leaving his vanquished adversary to a long struggle before reinstating himself on his legs.

Towards the middle of the summer, the females deposit their eggs, to the number of eight or twelve, in a little excavation, well exposed to the sun: the eggs are white, spherical, and of about the size of gall-nuts; these they carefully cover with earth, and leave to be hatched by the heat. The young appear about the beginning of autumn.

We know not why the flesh of the vegetable-feeding Tortoises should not be adopted, as well as that of the green Turtle, among the various articles which are in request for the table. There is much in habit and association of ideas; and though persons, who would not refuse Turtle, might turn from Tortoise with disgust, they may rest assured that, in Sicily and Italy, these land Tortoises are sold in the markets, principally for being made into soup, which is more esteemed than the flesh prepared in any other way.

We do not know whether the Tortoise described in so lively a manner by Gilbert White, and to which we have already alluded, belonged to the present species: probably it did, or to one very nearly allied. In a letter respecting it, to the Hon. Daines Barrington, Mr. White says:—"On the first of November, I remarked that the old Tortoise, formerly mentioned, began first to dig the ground in order to the forming of its hybernaculum, which it had fixed just beside a great turf of hepaticas. It scrapes out the ground with its fore-feet, and throws

it up over its back with its hind ; but the motion of its legs is ridiculously slow, little exceeding that of the hour hand of a clock. Nothing can be more assiduous than this creature night and day, in scooping the earth and forcing its great body into the cavity ; but as the noons of that season proved unusually warm and sunny, it was continually interrupted, and called forth by the heat in the middle of the day ; and though I continued there till the thirteenth of November, yet the work remained unfinished. Harsher weather and frosty mornings would have quickened its operations. No part of its behaviour ever struck me more, than the extreme timidity it always expresses with regard to rain ; for, though it has a shell that would secure it against the wheel of a loaded cart, yet does it discover as much solicitude about rain, as a lady dressed in all her best attire ; shuffling away on the first sprinklings, and running its head up in a corner. If attended to, it becomes an excellent weather-glass ; for, as sure as it walks elate, and, as it were, on tiptoe, feeding with great earnestness in a morning, so sure will it rain before night. It is totally a diurnal animal, and never pretends to stir after it becomes dark. When first awakened it eats nothing, nor again in the autumn before it retires ; through the height of summer it eats voraciously, devouring all the food that comes in its way. I was much taken with its sagacity in discerning those that do it kind offices ; for, as soon as the good old lady comes in sight, who has waited on it for more than thirty years, it hobbles toward its benefactress with awkward celerity, but remains inattentive to strangers. Thus, not only the ox knoweth his owner, and the ass his master's crib, but the most abject reptile and torpid of beings distinguishes the hand that feeds it, and is touched with the feelings of gratitude."

In a subsequent letter respecting the same animal, Mr. White says:—" Though he loves warm weather, he avoids the hot sun ; because his thick shell, when once heated, would, as the poet says of the solid armour,

‘scald with safety.’ He, therefore, spends the sultry hours under the umbrella of a large cabbage leaf, or amidst the waving forests of an asparagus bed. But, as he avoids the heat in summer, so in the decline of the year, he improves the faint autumnal beams, by getting within the reflection of a fruit wall; and though he never has read that planes inclining to the horizon receive a greater share of warmth, he inclines his shell by tilting it against the wall, to collect and admit every feeble ray.”

A discrepancy may be noticed in one respect, between the statement by M. Bibron, that it was always in the hottest part of the day that he observed the Tortoises basking, by the road sides in Sicily, so as to render their shells extremely hot, and Mr. White’s observation, that avoiding the hot sun, “the animal spends the more sultry hours” under the shade of a leaf. We have ourselves observed several of these Tortoises in captivity, (if it may be so called,) in our country, and we have frequently seen them exposed to the direct influence of a hot noonday sun, which they themselves sought, and which they evidently enjoyed. But we have frequently seen them sheltering themselves among the plants of the garden; and often so nicely have they been concealed, that we have had some difficulty in finding them; we think, however, that in such instances, the day has been either cloudy, or that rain had previously fallen. Indeed, we remember a Tortoise, in the garden of a friend, which was accustomed to bask at noon, tilted up against a southern wall, on which spread a noble vine; but we have sometimes missed the creature, and after long search found it under the leaves of a cucumber plant, or the broad umbrage of the rhubarb; we then thought, as did its owner, that it retired to shelter itself from rain: on one occasion, when we searched for it, both the night and the morning, as we well remember, had been wet.

The form of the carapace in the present species is subject to considerable variety. In general, however, it is of an oval figure, slightly broader behind than



before, and well arched above; whence the posterior margin descends almost vertically to the thighs and tail. In most cases, the horny plates covering the carapace are smooth, but sometimes they are concentrically striated, that is, furrowed with lines merging to a centre: the number of marginal plates is constantly twenty-five. The tail is of moderate length, (having twenty-five vertebræ,) and sheathed with a horny spur or nail at the tip. The *T. Græca* is plainly coloured. The plates of the carapace are of a yellowish green, with stains of black and yellow; the medium line of the plastron and its lateral margins are also of a yellowish green; the rest is black. The tip of the muzzle is brownish grey, the rest of the head is of a greenish or olive tint, as are also the neck, limbs, and tail; the nail, at the extremity of the latter, is black. The iris is brown, encircled with a very narrow whitish line. This species seldom exceeds a foot in length.

Messrs. Dumeril and Bibron have satisfactorily proved the specific distinction between the present species, and the Bordered Tortoise, (*Testudo marginata*), and the Moorish Tortoise (*T. Mauritanica*), which many naturalists have regarded as the same, or as near varieties. The Bordered Tortoise, (*T. marginata*), M. Bibron conjectures to be the Earth Tortoise (χελωνη κερσαια) of Aristotle, but not exclusively; for he supposes that this philosopher confounded the *T. Græca* also, under the same term, imagining the two species to be identical.

“The generally received opinion,” he observes, “that the Greek Tortoise is that which Aristotle meant to distinguish by the name of ‘Earth Tortoise,’ is at once nullified by the circumstance that this is not, as was supposed, the only species of land Tortoise which Greece produces, since the Bordered Tortoise is there, at least, as common as the former; and it is, we think, more reasonable to suppose, that these two species were confounded together under the same name; since nothing, either in the writings of the Greek philosopher, or of

other ancient authors, indicates that they had in their time distinguished between these two kinds of land Tortoises; unless, indeed, we thus look at a certain passage in the description of Greece by Pausanias, in which he says, that in the oak forests of Arcadia, are bred Tortoises, from the upper shells of which lyres may be constructed as large as those made from Indian Tortoises.

“Now, though this account, like many others by Pausanias, is somewhat exaggerated, there may be reason to think, that this author intended the Bordered Tortoise, of which the size, though far inferior to what certain of the Indian Tortoises attain, is nevertheless always somewhat larger than its congener, the *T. Græci*.”

We do not believe that the ancients made any distinctions between these two species: nice discrimination in points of this kind belongs to modern naturalists only.

The BORDERED TORTOISE is a native of the Morea, whence numerous specimens in the Paris museum have been brought, and which were collected there by the naturalists of the scientific commission under M. Bory de Saint Vincent. It has been received also from Egypt and the coast of Barbary, where, however, it appears to be less common than the Moorish Tortoise. In its manners and habits it is said to resemble the common, or Greek Tortoise; but we have no detailed particulars.

The Bordered Tortoise may be distinguished from its nearest allies, by the greater proportionate breadth of the posterior circumference of the carapace, and by the horizontal, or almost horizontal, position of the marginal part of that portion. The general figure of the whole shell is that of an oblong oval; on the sides, the marginal portion of the carapace is completely vertical; and posteriorly, it is more or less deeply indented according to age.

The head, the back of the neck, the tail, and the outer surface of the hind feet, are of a deep black: a band of the same colour runs along the inside of the



arms, from the elbow to the nails, whence it extends over the adjacent tubercles; the upper part of the arms, the top of the thighs, the throat, and the under surface of the tail, are of a pale orange colour, clouded more or less with a dusky tinge. The nails of the fore feet are of a dull grey; those of the hind feet brownish. Black is the ground colour of the carapace, but the centre of each horny plate is yellow, and this varying in intensity and extent, sometimes leaves only the margin of each plate of a black or blackish brown. The plastron is of a dull yellow, six or eight of the plates being marked each with a large triangular spot of black. Total length fifteen to sixteen inches.

The MOORISH TORTOISE, (*T. M. uritanica*.)—The name of Moorish Tortoise is given to this species, not because it inhabits the north of Africa exclusively, and which was anciently termed Mauritania, but because it is very abundant there. It is particularly common around Algiers, and for some years past great numbers have been sent to France, where they may be seen in the shops and markets for sale, not indeed, as M. Bibron archly remarks, for the same purpose as Turtles in England, that is, to make into turtle soup, so relished by the *bons vivans* of London, but to be placed as objects of rational curiosity in gardens, where they do no mischief, if provided from time to time with food, lettuce being preferred to all other vegetables. This species is found, also, along the western shores of the Caspian Sea, and over the adjacent country, but as far as we can learn it has never been observed in southern Europe; it does not exist in Greece, where the common or Greek Tortoise, and the Margined Tortoise are very plentiful, nor does it inhabit Italy, Sicily, and Sardinia, where the former of these species (the common) is spread.

M. Menestriés, during his travels to the Caucasus, found the Moorish Tortoise in great numbers in the gardens around Baikou, a town situated on the western

borders of the Caspian Sea, in the small peninsula of Abahéran; and it is not improbable that it may inhabit the northern shores of the Black Sea, between the embouchures of the Don river and the Dneister.

The ground colour of this species is olive; sometimes the plates of the carapace have a black band anteriorly, and a black centre, the rest of their surface being also irregularly mottled with black: generally, however, the centre, or areola, only of each plate is black, the rest being uniformly olive. Each plate of the plastron has a large black mark, on an olive ground. The internal surface of the arms, the upper part of the hind feet, the back of the neck, and the tail, are of a greyish brown, passing into a lighter tint on the thighs, the throat, and the outer surface of the arms. The jaws and nails are of a deep black. The iris is brown.

The GEOMETRIC TORTOISE, (*T. geometrica*.)—This beautiful little Tortoise, (see the accompanying engraving,) also belongs to the present group. It is a native of South Africa and the island of Madagascar; and derives its name from the radiating lines of yellow, forming angular figures on the plates of the carapace. The total length of this species is about six inches. The carapace is oval and convex; the nuchal plate is linear. The general colour is a fine deep black, the areola, or centre, of each plate being of a yellow tint, whence diverge rays of the same colour, to the number of eight or twelve, except on the lateral plates of the carapace, where they amount to two or three only. The rays of each plate being continuous with those of the plates adjacent, various angular, or geometrical figures are produced, which, contrasted with the black, have a very pleasing effect. The plastron is usually almost wholly yellow, from the great dilatation of the rays, which blend so much with each other, as to leave only narrow spaces of blackish brown between; though sometimes the centre of each plate only is yellow, the rest of the latter colour, with faint indications of

rays. The head and back of the neck are brown; a rounded yellow mark is placed before each eye, and an oblong streak of the same colour somewhat before and below the tympanum; yellow tortuous streaks run along the back of the neck, and this is also the colour of the lower jaw; the limbs are yellowish, with claws of brown.

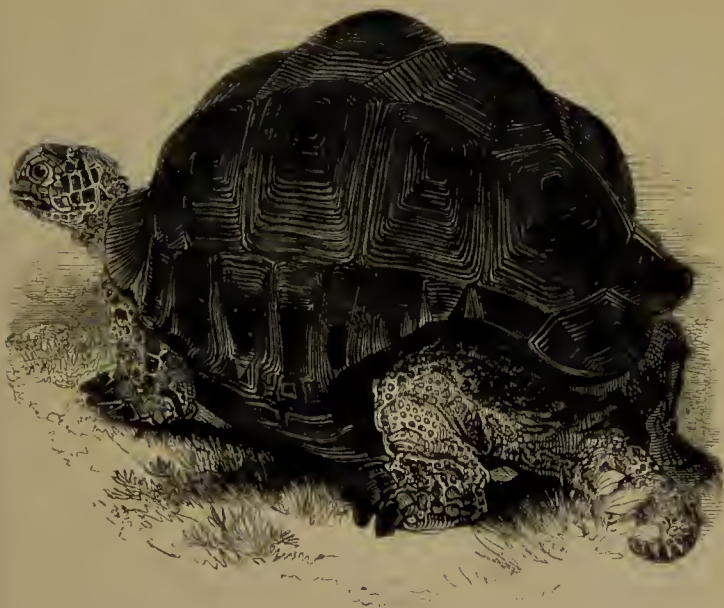
A species closely allied to the Geometric Tortoise, but differing from it in the absence of a nuchal plate, and in the greater elevation of the areolæ, or centres of the plates of the carapace generally, is a native of Pondicherry and Malabar. Its colouring is nearly the same as in the *T. geometrica*, but it somewhat exceeds that species in size. It is the *T. actinodes* of Bell, the *T. elegans* of Shaw, and has been regarded as a variety of the former, but erroneously. Of the manners of this species nothing is known, except from the account of M. Leschenault, who states that it is rather scarce, and inhabits places covered with brushwood.

The RADIATED TORTOISE, (*T. radiata*.)—This beautiful species is a native of Madagascar, whence it is frequently brought to the Cape of Good Hope, and to the Mauritius and Bourbon isles. Of its habits in its native country, nothing has been ascertained; but those which we have seen as captives in our climate have the general manners of the race. The carapace is hemispherical, the plates are simple, and black, with a yellow central spot, whence diverge lines of the same colour; the costal plates having the lines which are directed downwards particularly distinct. The nuchal plate is small and nearly square, or rather oblong. The plates of the plastron are ornamented with black and yellow; the head and back of the neck are black; a large mark of this colour occupies on the outer side of the hinder limbs, and a similar mark is placed on the outer side the elbow, encircling others of a smaller size. The other parts of the limbs and the tail are of a pale yellow, excepting the

tip of the latter, and the nails of the hinder feet, which are black.

The ELEPHANTINE TORTOISE, (*T. elephantina*, Bibron.) (See engraving.) The name of *T. Indica*, or Indian Tortoise, has been assigned to certain gigantic examples of this group, now regarded by most naturalists as forming so many distinct species. Messrs. Dumeril and Bibron consider five species to be thus established, all of which formerly bore the name of *Indica*, or Indian, a title which they, therefore, entirely discard, as it belongs as much to all as to one, no single species having a claim to it by right of priority.

Most persons who have visited the gardens of the Zoological Society, have seen with surprise huge ponderous Tortoises supported on short column-like legs, slowly moving about, or feeding at ease on the vegetables around them, and exhibiting an air of apathetic indifference to the bystanders gazing upon them. These monsters of their race (called in the catalogues, *T. Indica*,) belong to the species, entitled by M. Bibron, *T. elephantina*. They are not natives of India, but of the Seychelles isles, and also of the Comoro islands in the Mozambique channel: from the Seychelles they have been introduced into the Mauritius; and some of the individuals turned out in the latter island, have been imported into England. In the "Proceedings of the Zoological Society," July 9th, 1833, will be found a notice of one of these Tortoises then living in the Zoological Gardens, and which had been recently presented to the Society by Lieutenant-general Sir Charles Colville, late governor of the Mauritius. The specimen in question was "one of those which were brought from the Seychelles islands to the isle of France, (Mauritius,) in 1766, by the Chevalier Marion du Fresne, and is believed to have since remained unchanged in size and appearance. Consequently, it had been, (in 1833,) sixty-seven years in the island, having been full grown, or at least as large as it was in 1833, when



ELEPHANTINE TORTOISE.



first introduced; and hence, what its real age was it is impossible to conjecture. Its length, measured along the curve of the back, was 4 feet, 4½ inches; its breadth, taken in the same manner, 4 feet 9 inches. The length of the plastron was 2 feet 8 inches; the breadth of the same 2 feet 1½ inch. Its weight 285 pounds.

We have seen other specimens still larger, and apparently of the same species.

We know little or nothing of the habits of this Tortoise in its native islands; from their proximity, however, to the equator, we may suppose that this species never hibernates, or that it only retires for a short period. Those which we have seen in our country, never attempted, as far as we could observe, to make any burrow, or hole, towards the decline of summer, and were always taken under cover and buried beneath straw, there to remain during the winter, which they passed in a torpid condition; but we cannot judge with confidence of the natural habits of animals, from their mode of life in a country utterly uncongenial with their nature, and in which their very existence, even for a few months, is very precarious. Most, if not all, those which we have been acquainted with, have died before the return of spring, or during its commencement.

Of the allied species we may notice the following:—

1. The *T. gigantea*, which equals the preceding in size; its country is not ascertained.
2. The *T. nigra* of Quoy and Gaimard, which those travellers say was brought originally from California, but which M. Bibron has reason for considering as a native of the Galapagos isles.
3. The *T. Daudinii*, a gigantic species from India
4. The *T. Perraultii*, also from India.\*

\* It is probably to the *T. nigra*, that a specimen in the possession of the Zool. Soc. (1834) is referable, respecting which the following notice occurs in the Proceedings, Oct. 14, 1834:—"A letter was read (to the scientific meeting) addressed to the secretary by the Hon. Byron Cory, dated His Majesty's ship Dublin, Sept. 25, 1834, giving some particulars relative to a large specimen of the Tortoise from the Galapagos island, presented by the writer to the society. The specimen weighs 187



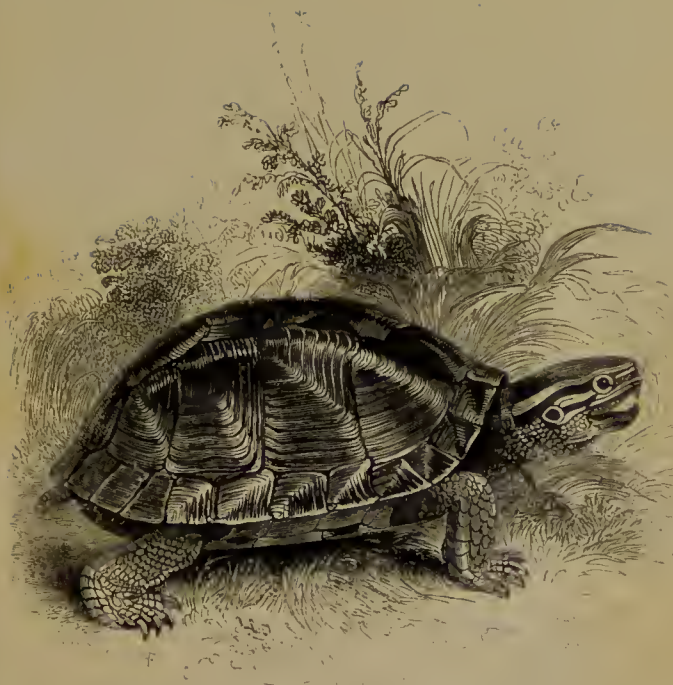
Darwin ("Voyages of the Adventure and Beagle") gives the following admirable account of the great Tortoise of the Galapagos islands, which he terms *T. Indicus*, and respecting which Dampier says, "The land Turtles are here so numerous, that five or six hundred men might subsist on them for several months, without any other sort of provision. They are so extraordinarily large and fat, and so sweet, that no pullet eats more pleasantly."

"These animals," observes Mr. Darwin, "are found I believe in all the islands of the Galapagos archipelago, certainly in the greater number. They frequent, in preference, the high damp parts, but likewise inhabit the lower and arid districts."—"Some individuals grow to an immense size. Mr. Lawson, an Englishman, who had, at the time of our visit, charge of the colony, told us, that he had seen several so large, that it required six or eight men to lift them from the ground, and that some had afforded as much as two hundred pounds of meat. The old males are the largest, the females rarely growing to so great a size; the male can readily be distinguished from the female by the greater length of its tail.

"The Tortoises which live on those islands where there is no water, or in the lower and arid parts of the other islands, chiefly feed on the succulent cactus. Those which frequent the higher and damp regions, eat the leaves of various trees, a kind of berry called guayavita, which is acid and austere, and likewise a pale green filamentous lichen, that hangs in tresses from the boughs of the trees.

"The Tortoise is very fond of water, drinking large quantities, and wallowing in the mud. The larger islands

pounds, and measures in length, over the curve of the dorsal shell, 3 feet 8  $\frac{1}{2}$  inches, and along the ventral shell 2 feet 3  $\frac{1}{2}$  inches: its girth round the middle being 6 feet 3  $\frac{1}{2}$  inches. It is, consequently, much smaller than several specimens of the Indian Tortoise from the Seychelles islands, which have at different times been exhibited in the society's gardens. The lateral compression of the anterior part of the dorsal shell, and the elevation of its front margin by which the Galapagos Tortoise is distinguished from the Indian, (*T. elephantina*,) are strongly marked.



AMBOINA BOX TORTOISE.



alone possess springs, and these are always situated towards the central parts, and at a considerable elevation. The Tortoises, therefore, which frequent the lower districts, when thirsty are obliged to travel from a long distance. Hence broad and well-beaten paths radiate off in every direction from the wells, even down to the sea-coast; and the Spaniards, by following them up, first discovered the watering-places. When I landed at Chatham island, I could not imagine what animal travelled so methodically along the well-chosen tracks.

“Near the springs it was a curious spectacle to behold many of these great monsters; one set eagerly travelling onwards with outstretched necks, and another set returning after having drunk their fill.

“When the Tortoise arrives at the spring, quite regardless of any spectator, it buries its head in the water, above its eyes, and greedily swallows great mouthfuls, at the rate of about ten in a minute. The inhabitants say each animal stays three or four days in the neighbourhood of the water, and then returns to the lower country; but they differed in their accounts respecting the frequency of these visits. The animal, probably, regulates them according to the nature of the food which it has consumed. It is, however, certain that Tortoises can subsist even on those islands where there is no other water than what falls during the few rainy days in the year.

“The Tortoises, when moving towards any definite point, travel by night and day, and arrive at their journey's end much sooner than would be expected. The inhabitants, from observations on marked individuals, consider that they can move a distance of about eight miles in two or three days. One large Tortoise which I watched, I found walked at the rate of sixty yards in ten minutes; that is, three hundred and sixty in the hour; or four miles a day, allowing also a little time to eat on the road.

“During the breeding season, when the male and female are together, the male utters a hoarse roar or bellowing,

which, it is said, can be heard at the distance of more than a hundred yards. The female never uses her voice, and the male only at such times. They were at this season (October) laying their eggs. The female, where the soil is sandy, deposits them together, and covers them up with sand; but where the ground is rocky, she drops them indiscriminately in any hollow. Mr. Bynoe found seven placed in a line in a fissure. The egg is white and spherical: one which I measured was seven inches and three-eighths in circumference.

“The young, as soon as they are hatched, fall a prey in great numbers to a buzzard with the habits of the Caracara vulture. The old ones seem generally to die from accidents, as from falling down precipices; at least, several of the inhabitants told me they had never found one dead without some such apparent cause.

“The inhabitants believe that these animals are absolutely deaf; certainly they do not overhear a person walking close behind them. I was always amused when overtaking one of these great monsters, as it was quietly pacing along, to see how suddenly the instant I passed, it would draw in its head and legs, and uttering a deep hiss, fall to the ground with a heavy sound, as if struck dead. I frequently got on their backs, and then upon giving a few raps on the hinder part of the shell, they would rise up, and walk away; but I found it very difficult to keep my balance.

“The flesh of this animal is largely employed both fresh and salted; and a beautifully clear oil is prepared from the fat. When a Tortoise is caught, the man makes a slit in the skin near its tail, so as to see inside its body whether the fat under the dorsal plate is thick. If it is not, the animal is liberated; and is said to recover soon from this strange operation.

“In order to secure the Tortoises, it is not sufficient to turn them like turtles; for they are often able to regain their upright position.” While staying in the upper district of James’s island, where a party of Spaniards were.

employed in catching Tortoises, Mr. Darwin and his companions lived entirely on the meat of these animals. "The breastplate roasted with the flesh attached to it," he says, "is very good, and the young Tortoises make excellent soup; but otherwise, the meat to my taste is very indifferent."

Of the species of the genus *Testudo*, restricted to America, we may select the CAGADO, or CHARCOAL TORTOISE, (*T. carbonaria*, Spix.)—This handsome Tortoise is very common in Brazil, Chili, Cayenne, and other parts of South America. Several of these animals, in 1834, were sent to the Zoological Society, by Sir Robert Ker Porter; who stated, that they are regarded as a great delicacy at Caraccas, and sold as such in the market.

The Cagado is, when fully grown, about eighteen inches long in the admeasurement of its shell. It lives in wooded districts, near the borders of rivers; but we know nothing of its particular habits. Those which we have seen in England, exhibited no difference, as to their manners, from other species.

The form of the carapace is an oblong oval, well arched above, depressed over the middle of the back, and contracted at the sides. There is no nuchal plate. The general colour of the carapace, is of a deep black; the centres, or areolæ, of each plate being yellow. The limbs and neck are of a slate colour; but the heels, the tail, the scale covering the tympanum, and several about the lower jaw, are of a beautiful carmine red, which tinges more or less distinctly other parts of the integuments. The scales on the top of the head are of an orange yellow, as is also the margin of the plastron, the centre of which is occupied by a large mark of black, varying in extent.

Closely allied to this species is the *T. tabulata*, or TABLED TORTOISE, which inhabits the same regions; its carapace, however, is less depressed in the middle, the sides are not contracted, and the skin of the limbs, neck,

and tail, is brown; but the jaws, the top and sides of the head, and the external surface of the fore-feet, are of a pale yellow.

The GOPHER TORTOISE, (*T. Polyphemus*.)—With this animal we shall close our selection of examples of the genus *Testudo*, as restricted by modern naturalists.

The Gopher Tortoise (*T. Carolina* of Leconte,) is the only species of the present genus indigenous to North America: its range of country is from the Floridas, to the river Savannah, about the 32° parallel of north latitude; beyond which it is not found. Its favourite abodes are extensive pine forests, but it does not restrict itself exclusively within their limits; it occasionally quits them, and ventures into the open and cultivated parts of the adjacent country, and there makes considerable depredations, especially in the fields planted with potatoes. It digs very deep burrows, and in these it remains concealed during the day, coming forth at night to feed, its habits being nocturnal. Though of small size, being altogether but about sixteen or seventeen inches long, it possesses great strength, and is said to move easily with a man standing on the back, and to be even capable of sustaining a weight of six hundred pounds. This account, however, is doubtless an exaggeration. We know, indeed, that these animals have all amazing muscular power, and we have seen some of the larger species crawl unincumbered by heavy weights; six hundred pounds would be easily borne by the Elephantine Tortoise, but not we think by so small a species as the present.

If the Gopher Tortoise occasionally produces mischief in gardens or cultivated grounds, it in some measure repays for the damage done; for its flesh, according to all accounts, is very excellent, and is, therefore, sought after for the table.

#### GENUS HOMOPUS.

The genus *Homopus* is distinguished by the toes of the anterior as well as the hinder feet, being four in number,



and furnished with nails. It presents us with only two species; of these, one, the VERMILION TORTOISE, (*Homopus areolatus*,) is a native of eastern Africa and Madagascar.

Its colour after death, is generally a pale green, the centre of each plate being of a chesnut brown; while the limbs and head are yellowish. When alive, however, the top of the head is of a fine red, the jaws and limbs are greenish, and the neck black, with a tinge of green. The carapace varies from yellow to yellowish green, or pale green sometimes intermingled with shades of purple; but the margin and the centre of each plate are chesnut coloured.

This species is of one the smallest known of land Tortoises, seldom exceeding five or six inches in total length.

The other species (*H. signatus*, Bibr.) is also a native of Africa; but its shell only has been hitherto described. We have been able to ascertain nothing respecting their habits.

#### GENUS PYXIS.

This genus is distinguished by the anterior part of the plastron being moveable, and capable of being closed on the upper shell, so as to shut in the animal's head and fore-limbs.

One species only is known, namely,

The ARACHNOID TORTOISE, (*P. arachnoides*, Bell.) The first description of this curious Tortoise is due to Mr. Bell, whose account was published in the 15th vol. of the Linnean Transactions. It is a native of India, and the islands of the Indian Archipelago; but we are entirely without information as to its habits and manners.

It is natural to ask, why this creature should have its shell so constructed, as to be able to shut itself up within it. Doubtless, it has some peculiar enemies, against which it needs this curious mode of self-protection. What these enemies may be, we do not know; but this we do know, that extraordinary contrivances for effecting the preservation of any animal, imply the liability of

that animal to attacks from foes, which render such contrivances necessary; contrivances which bespeak the care of the great Creator.

The general colour of the head, neck, and tail, is brown; the limbs are yellowish, with a black stripe. The ground colour of the carapace is reddish yellow; each plate has eight or ten triangular black marks, disposed in a radiating manner: the plastron is of the same colour as the carapace, with black marks on each side. This species is of small size, being about six inches in total length. The annexed sketch represents this prettily

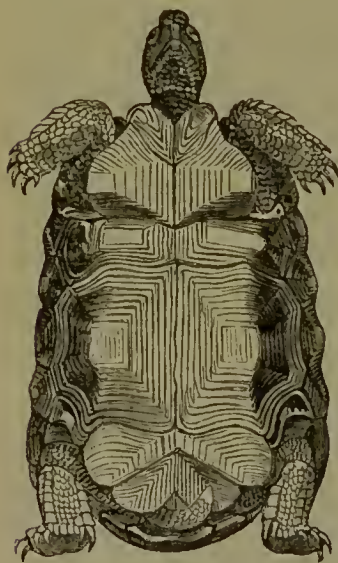


FIG. 1.

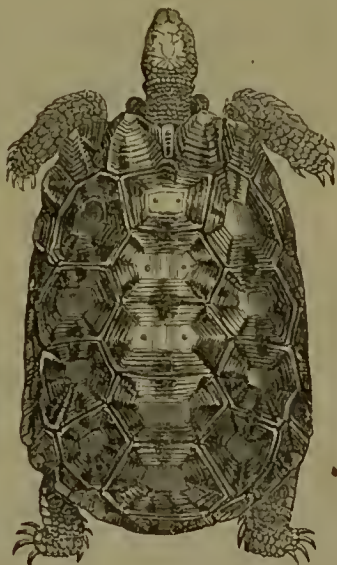


FIG. 2.

marked Tortoise in two aspects: Fig. 1, shows the under surface; the joint of the plastron is clearly visible: fig. 2, the upper.

#### GENUS CINIXYS.

The genus *Cinixys*, distinguished by the freedom and mobility of the hinder portion of the carapace, as shown

in page 19, contains but three species, as far as known at present. Two of the species are natives of Guiana; but the country of the third is not ascertained.

No information respecting the habits of the animals of this species has been received. The species in question are HOME'S TORTOISE, (*C. Homeana*, Bell;) the INDENTED TORTOISE, (*C. erosa*, Gray;) and BELL'S TORTOISE, (*C. Bellii*, Gray.)

We shall now leave the land, or terrestrial Tortoises, having said enough to give a clear idea of their general character. The reader must remember, that we aim only at an outline, and not at a description and comparison of every species; and will, therefore, not be surprised at our passing rapidly from one group to another.

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## II. MARSH TORTOISES, OR EMYDES.

THE family to which we now proceed is much more extensive than that of the land Tortoises. All the species inhabit marshy places, ponds, lakes, and small rivers. The conformation of their feet, to which we have alluded, enables them both to swim with facility, and to walk on the ground; they can leave the water at will, and crawl about the banks of the stream, or traverse the muddy margin of the lake, to which they always retreat for safety. We have stated, that in the land Tortoises the osseous box in which they are inclosed is strong and thick, and completely solidified; the upper portion, or carapace, being remarkable, at least in most instances, for its convexity. In these marsh Tortoises, however, not only is this box less thick and strong than in the land Tortoises, but it remains for a considerable period before becoming solidified. Long after the animals are hatched, the spaces between the ribs, and the intervals which separate the parts of which the plastron is

composed, are in a cartilaginous state, and yield to the pressure of the finger. In some species, this slowness of ossification is more remarkable than in others; but when the ossification is complete, the whole forms but a comparatively feeble shield; and the carapace, moreover, is greatly depressed, except in two or three instances. Generally, the horny plates covering the carapace are thin and smooth, exhibiting either no areolæ, or marked centres, and linear elevations, or but slight indications of them. In some instances, the scales are arranged like slates on the roof of a house; the posterior margin of one, overlaying the anterior margin of that next following.

The general figure of the osseous box of the marsh Tortoise is oval; mostly, however, the carapace is broader behind than before, but sometimes there is no difference; and in these cases, the sides of the carapace between the fore and hind limbs are straight.

Almost all the marsh Tortoises are capable of withdrawing and concealing their limbs and head within the carapace and plastron; and in the genus *Cistudo*, by aid of the two moveable portions of the latter, the animals can completely shut themselves up. But in the genus *Emysaurus*, neither the carapace nor plastron is sufficiently extensive to allow of the concealment of those parts; and in another genus, *Platysternon*, the plastron from its breadth suffices to conceal the limbs when folded; but the head remains constantly exposed. The limbs are never covered with coarse tubercular scales; the scales, on the contrary, are always flat, thin, small, and disposed like tiles, that is, imbricated.

The tail generally extends beyond the margin of the carapace as far as the feet when they are stretched back; sometimes, however, it is very short.

The neck is mostly of considerable length, not however from the number of the vertebræ, which is usually only eight, but from their elongated form; when retracted, it is either folded back upon itself, as in one

group, (the Cryptodera,) or turned to one side, as in another group, (the Pleurodera).

In modes of life and general habits, the marsh Tortoises are very different from their terrestrial relatives. Far from being slow and laboured in their movements, they are prompt, and comparatively quick, and they swim with considerable address. Their food, instead of consisting of vegetable substances, is derived from another source. They are carnivorous, and prey upon frogs, insects, worms, and small fishes, which they pursue with avidity. Like the land Tortoises, the females deposit their eggs in shallow excavations, which they make in the earth, on the banks of the waters which they ordinarily inhabit; so that as soon as the young are hatched, they may have a place of refuge from danger; for, at this early age, they have many enemies to avoid, such as snakes, birds of prey, and various quadrupeds.

The number of Tortoises belonging to this family, as far as known at present, amounts to seventy-four. Of these, according to M. Bibron, three are European, eighteen Asiatic, six African, twenty-three South American, twenty-two North American, and two Australian. We have previously stated, that the marsh Tortoises are divided into two sub-families or tribes, namely, Cryptodera and Pleurodera.

### TRIBE I. CRYPTODERA.

The Cryptodera are distinguished from the Pleurodera, not only by the power which they possess of withdrawing their cylindrical neck, sheathed in loose skin, immediately under the centre of the fore part of the carapace, but also by the shape of the head. The head at the back part, is as deep as it is broad, and it diminishes in breadth from the eye to the muzzle; so that at its fore part it assumes the form of a blunt triangle. The eyes are placed on the sides of the head, and the orbits are large. The jaws are much stronger than in the Pleurodera; they have sometimes only a simple cutting edge;

sometimes the thin edges are indented; but in most, the anterior part of the upper mandible is deeply notched; and on each side of this notch is a tooth, or rather angular prominence, while the tip of the lower mandible fits into the intermediate notch. Sometimes the upper mandible closely resembles that of the falcon.

In one important point the Cryptodera differ remarkably from the animals included in the second tribe, or Pleurodera. The pelvis is articulated to the internal surface of the carapace, by a cartilage corresponding to the *os sacrum*, while with respect to the plastron it is free; a circumstance which permits most of the marsh Tortoises of the tribe Cryptodera, to move slightly the latter portion of their osseous box; and this, accordingly, has a less degree of solidity. In the Pleurodera, on the contrary, the pelvis is firmly fixed, on the one part to the roof of the carapace, and on the other part, to the floor of the plastron.

The Cryptodera are divided into many genera, and of these we shall first notice the genus *Cistudo*, containing the Box Tortoise.

#### GENUS CISTUDO.

In this genus, the fore-feet have five toes, the posterior four; the plastron is broad, oval, and attached to the carapace by a cartilaginous union; a transverse hinge divides it into two moveable portions or valves, by means of which the whole body may be completely shut in: it is covered with twelve horny plates.

The CAROLINA TERRAPIN, or BOX TORTOISE, (*C. Carolina*.)—This remarkable species, both in its habits, in the vaulted form of its carapace, and in the structure of its feet, which are but slightly palmated, forms the link between the marsh and the terrestrial Tortoises; being more particularly allied, on the side of the latter, to the genus *Cinixys*. In the genus *Cinixys*, the feet are less club-shaped than in other land Tortoises, the carapace is more



depressed, and the hinder part of the carapace (not the plastron) is moveable.

The Carolina Terrapin inhabits North America, from Hudson's Bay to the Floridas. It is not aquatic in its habits, but, like the terrestrial Tortoises, lives exclusively on the land, giving preference to woods, and dry situations, where it digs burrows for its winter dormitory, and also shallow excavations in which to deposit its eggs. Its food consists both of vegetables and insects. Though its flesh is occasionally eaten, it is but in low estimation; the eggs, however, which are about as large as those of a pigeon, are accounted excellent, and are much sought after.

Of all the marsh Tortoises, this species has the shortest and most convex carapace; and a sort of keel runs down its centre. Nevertheless, it is subject to many variations, not only as it respects colour, but even general form; in some individuals it is oblong and somewhat depressed, and ornamented with large yellow spots, of an irregular form, blending into the ground colour, which is brown. In others the spots of yellow are distinct, and the form of the carapace is hemispherical. Others, again, have the carapace and plastron black, mottled with orange; and others, the carapace much depressed, destitute of a keel, and of an olive green colour.

The AMBOINA BOX TORTOISE, (*Cistudo Amboinensis*.)—This elegant species, of which we give a figure, (see engraving,) is a native of Java and Amboina, but nothing is known of its manners. Its carapace is oval, moderately elevated, and keeled above; the top of the head is of a yellowish brown, bordered with black, but the sides of the head, the jaws, the sides and under part of the neck are of a rich bright yellow, relieved by a black line beginning behind each eye, and running to the neck; a black and yellow line also advance from the eye to the nose. The carapace is brown with a yellow line along the



centre, and a yellow margin. The plastron is yellow, each plate having a black mark at its posterior angle.

The EUROPEAN BOX TORTOISE, (*Cistudo Europæa*.)—Like the Carolina species, the present example is subject to great variation in the form of its shell, and hence some degree of confusion has arisen, in consequence of varieties having been mistaken for distinct species.

This pretty Tortoise is very widely spread, and might, no doubt, be naturalized in the southern counties of England. It is found not only in Greece, Italy, and the adjacent islands, as well as in Spain and Portugal, but it inhabits the south of France, Hungary, Germany, and even Prussia. Every where it gives preference to still waters, lakes, ponds, and marshes, in the mud of which it delights to bury itself. Sometimes, however, invited by the sun, it comes to the surface, where it remains for hours motionless, in the apparent enjoyment of the warmth. Its food consists of aquatic insects and larvæ, and particularly of small fishes, to which it gives chase, or which it seizes as they unwarily approach within reach. These it kills previously to devouring them, but rejects the air sac, which rises and floats on the surface; and the people of the countries where this Tortoise is found, are accustomed to judge of the plenty or scarcity of these animals in any pool or sheet of water, by the numbers of these floating air sacs. The flesh of the European Box Tortoise, though not very delicate, is nevertheless eaten on the continent: it is said, however, to be greatly improved by feeding the animals, for some time, on grains, bran, and other vegetable aliment.

When about to lay her eggs, the female seeks a dry place, near the edge of the water, and there scoops out a shallow hole, in which she deposits them; they are of a white colour marbled with grey.

On the approach of winter, these Tortoises leave the water, and retire into holes about the bank, or in sheltered nooks, and there bury themselves, passing the

cold season in lethargy: they revive about the middle of spring, and then return to the water, and resume their active habits.

The general colour of the carapace is dusky black or reddish brown, agreeably ornamented with spots or streaks of yellow, radiating from the centre of each plate. The plastron is yellow, sometimes variegated with chestnut brown. Total length about ten inches. The *Testudo lutaria*, *T. pulchella*, *T. meleagris*, *T. flava*, and *T. orbicularis*, are mere varieties of this species; and the *Hellenic emys*, figured in the French work of the "Commission de Morée," is specifically the same.

#### GENUS EMYS.

Passing to the genus *Emys*, which includes many species, we may observe, that the characters of this group are as follow:—Fore feet with five toes, hind feet with four; plastron broad, immoveable, solidly united to the carapace, and covered with twelve plates; head of the ordinary size; tail long. As examples of this genus, we may notice the following species.

The CASPIAN EMYS, (*Emys Caspica*.)—This Tortoise abounds in the countries bordering on the Caspian Sea, and inhabits also Dalmatia and the Morea, where it is not uncommon. M. Bory St. Vincent found it in most of the shallow waters of the Greek peninsula. Its habits resemble those of other marsh Tortoises, and it lives on insects, small fishes, etc.

The carapace is of an olive tint, marked with winding confluent lines of a golden yellow, bordered with black, forming a sort of irregular network. The plastron is black, more or less variegated with yellowish. The head and neck are ornamented with yellow lines; three on the latter being edged with black: yellow lines also run down the limbs, and over the tail.

An allied species, the SIGRIZ EMYS, (*Emys Sigriz*), is a native of the Mediterranean coast of Africa, and also of

Spain. Among the American species of this genus, which are very numerous, we select the following.

The SALTWATER TERRAPIN, (*Emys concentrica*).—This *Emys* is found both in North and South America, but more commonly in the former, where it extends from New York to the Floridas. It is generally known by the name of the Saltwater Terrapin, because it gives preference to saline marshes, and in some districts is very abundant. It is in great request, its flesh being highly esteemed as a delicacy for the table, especially at the close of the summer, when the animals have retired to their winter dormitory. They are then fat, and considered as a luxury. At this season they are easily captured; some are surprised on land, preparing to bury themselves; others are disinterred from their winter asylum. During the summer, however, they are not to be caught without difficulty, for the extensive salt marshes of Carolina, where they are extremely numerous, afford them a secure asylum. In these marshes, when the sun is glowing brightly over head, shoals of Saltwater Terrapins may be seen crowded together on the mouldering trunks of fallen trees, half floating, half buried in the mud; and assemblages may be observed on little mounds of earth, which rise above the water, there basking in the genial rays. They are very shy and timid, and on the approach of an enemy, plunge into the water, and disappear.

There are several varieties of this Tortoise, with respect to colour and the disposition of the markings; the general colouring, however, is as follows:—The large scale covering the top of the head is black, or green, the rest of the head is green mottled with black. A greenish tint, irregularly dotted with black, pervades the neck, limbs, and tail. The iris is yellow, the pupil black. The plates of the carapace are olive green, with concentric lines of brown, forming irregular circles. The plates of the plastron are yellow, also marked with lines of brown following their contour. Total length about ten inches.

The DECUSSATED EMYS, (*Emys decussata*).—This

elegant Tortoise is a native of St. Domingo, but of its habits in its native island little is known. From Mr. Bell, who has observed many living examples in this country, we learn that it is extremely voracious, greedily devouring flesh, and attacking frogs and fishes with great avidity. The carapace is of an oval form, convex, and slightly keeled; its colour is of a uniform yellow. The plates are marked with concentric ridges, or linear elevations and furrows, intersected by similar lines radiating from the centre of each plate, and hence the specific title "decussated."

The PAINTED EMYS, (*Emys picta*.)—Of all the Emydes, this is the most essentially aquatic; so much so indeed, that it soon perishes if removed from the water. It inhabits stagnant ponds or lakes, and is never found in streams or rivers. It is very common in the United States of America, but, from the ill-flavour of its flesh, is never used as food.

We have known several instances of this Tortoise being kept alive in England. In warm weather they were very lively, swimming about the vessel of water in which they were preserved; they seemed to enjoy the rays of the sun, and would float with the head just emerging from the shell, or remain on the edge of the vessel, with the carapace out of the water, luxuriating in the genial temperature. Raw meat, cut small, was eagerly devoured. They passed the winter in a torpid state, in a box filled with cotton or flannel, to which they retired, or in which they were placed when signs of dulness appeared.

The carapace is considerably depressed, the plates are of a deep brown, those of the centre having the anterior margin beautifully bordered with yellow, and a double line of black; the side plates are similarly ornamented, both on their upper and anterior edge: the plastron is yellow, the head and neck are black, elegantly marked with oblong streaks and lines of fine yellow. When young, the Painted Emy is circular in its contour, rather than oval.

Only one species of *Emys* belongs to Africa, namely,

SPENGLER'S EMYS (*E. Spengleri*;) and it appears to be a native of Bourbon and the Mauritius, and not of the continent. In the warmer regions of Asia, as India and China, several species of this genus are indigenous; but, excepting that they agree in general habits with the rest of their race, little, as it respects their modes of life, is known. One of the most common of the Indian species is the THREE-KEELED EMYS, (*E. trijuga*.)

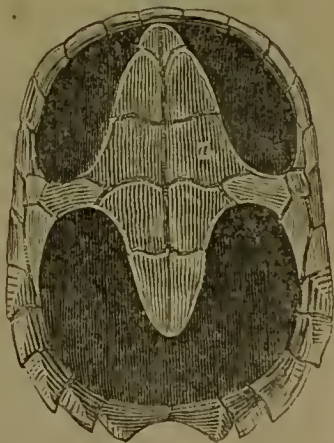
Passing by the genus *Tetraonyx*, which contains two species belonging to India, and the genus *Platysternon*, of which one species only is known, which is a native of China, and remarkable for the enormous size of its head, in proportion to the body, we come to the genus *Emysaurus*.

#### GENUS EMYSAURUS.

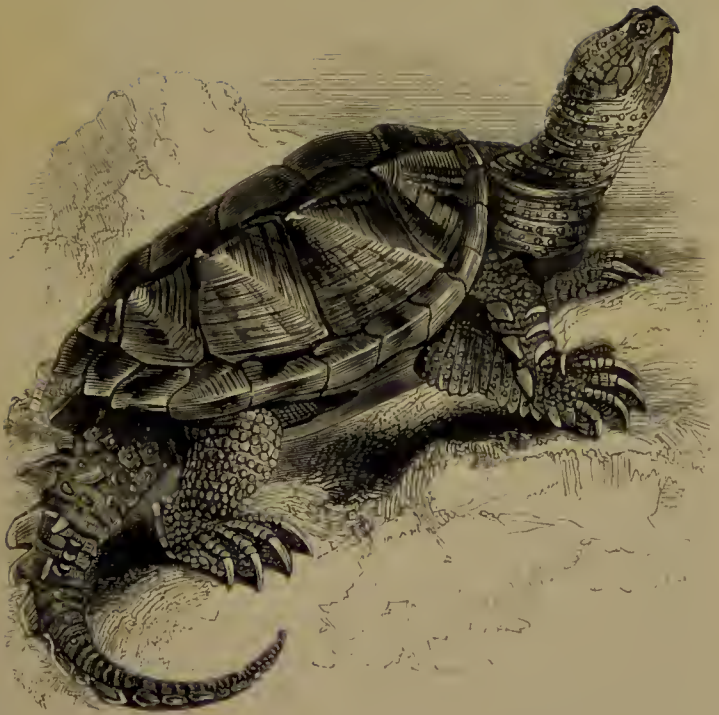
The genus *Emysaurus*, (*Chelydra*, Schweigger,) of which only one species is recognised, is characterized by the head being large, and covered with small plates; the upper mandible hooked; two small wattlelike excrescences below the under mandible; by the plastron not being moveable, of a cross-like shape, (see annexed figure; *a*, the plastron,) and covered with twelve plates; by the tail being extremely long, compressed, and surmounted by a ridge of strong scales, as in the crocodile.

The limbs are very robust, and the nails of the toes are strong, hooked, and sharp.

Although the head is of great size, it is capable of being withdrawn beneath the carapace; but not so the tail and limbs.



The ALLIGATOR TORTOISE, (*Emysaurus serpentinus*, Bibron; *Chelydra serpentina*, Schweigger.)



ALLIGATOR TORTOISE.







The Alligator Tortoise (see engraving) is one of the most extraordinary animals of the present tribe of Tortoises. In many respects, not only externally, but internally, it exhibits an approach to the crocodiles or alligators, and may be regarded as forming an intermediate link. Its strong hooked mandibles, its powerful limbs, its claws which resemble those of an eagle, its depressed body and long tail, ridged above with elevated scales, harmonize with a certain expression of ferocity, and render it repulsive. Nor is its character out of keeping with its aspect; it is one of the most savage and destructive of its race, and preys not only upon fish and frogs, but also upon small aquatic quadrupeds and birds. This Tortoise is a native of Carolina and the warmer districts of North America, diversified by morasses, lakes, and rivers; but it does not appear to be common. We have ourselves only seen one living specimen in this country, which was a young male, about two feet six inches in total length; but when adult it exceeds three feet, and is of great weight and power. Rivers and lakes are indifferently tenanted by it, and it swims with great celerity. It pursues frogs and other aquatic reptiles, and even fish, seizing them with its jaws, and tearing them in pieces by means of its talons; it lurks among the luxuriant and floating leaves of water-plants, and suddenly darting out its head, catches with a snap the unwary duck, or other animal swimming within its reach. The strength of its jaws is surprising; so violent and forcible is their bite, that as Mr. Bell has himself witnessed, a stick of half an inch in diameter, is at once snapped asunder; indeed, as we can testify, it is not safe to approach one of these Tortoises unguardedly; they are extremely vicious, and will snap at the hands of a person, if brought too near them, and even follow up the attack. Mr. Bell records the instance of a sailor, whose finger was actually snapped off by a specimen of a trionyx, (one of the savage fluviatile Tortoises,) on ship-board; the animal was placed in the Surrey Zoological Gardens.

The young Alligator Tortoise, which came under our own observation, would snap violently and repeatedly at a stick, or any other thing held towards it, or at the hands or arms. We notice this the more particularly, because we have seen persons, deceived by the apparently tranquil and dormant state of large fresh-water Tortoises, advance their hands to touch them, ignorant of the suddenness with which they make their snap, and of the severity of their bite.

The carapace of the Alligator Tortoise is of an oblong oval figure, depressed with three longitudinal ridges or keels above; and having for the posterior margin a notch and three points on each side, formed by the scales.

The two last genera of the present tribe are both peculiar to America.

#### GENUS STAUROTYPUS.

Of these, one, *Staurotypus*, is characterized by the head being large, elongated, and pyramidal, the mandibles hooked, and the under jaw (see annexed figure) furnished with fleshy excrescences. The plastron is solid, but with the anterior part moveable. In the females the tail is short; in the males thick and long. Two species are known, both Mexican; the first, *S. triporcatus*, has the carapace three keeled above; the second, *S. odoratus*, has the carapace with a single keel only. This species is said to smell strongly of musk.



#### GENUS CINOSTERNON.

The genus *Cinosternon* has the head also pyramidal, and the throat furnished with pendulous excrescences; but the plastron has the anterior and posterior parts moveable upon an intermediate fixed portion. In other respects it is very closely allied to the preceding genus.



TRACAXA.



Three species are described, one as a native of Cayenne, one of Mexico, and one of Pennsylvania. The latter, (*C. Pennsylvanicum*,) is very common in the United States, where it lives in muddy waters, and feeds on frogs and small fishes. It smells strongly of musk. It is about seven or eight inches in length.

## TRIBE II. PLEURODERA.

In this tribe, as already stated, the neck is not properly retractile; so that the head is concealed, not by being drawn back in a straight line, but by the neck folded to one side of the opening of the shell. Besides this, the arms are incapable of being completely drawn within the carapace and plastron. It may be remarked, that in all the genera which compose this tribe, (one alone excepted,) the head is more or less depressed; and that the eyes, instead of having a lateral situation, are placed almost on its upper surface, and are seated very close together, the vision being directed obliquely upwards. In two genera only, the top and sides of the head are furnished with scales or plates. The jaws have sharp-cutting edges. The tail is usually short and pointed. The pelvis is always solidly united both to the carapace and plastron. M. Bibron enumerates seven genera belonging to this tribe, of which one, (*Peltocephalus*,) forms the link between this and the preceding tribe.

## GENUS PELTOCEPHALUS.

In this genus the head is thick, nearly four-sided, and conical, covered with large plates, slightly overlaying each other. The jaws are extremely powerful and sharp-edged; the upper has an acute hook at its extremity. The eyes are lateral; the plates of the carapace in some degree overlay each other like tiles; the limbs are robust; the claws straight and strong; the tail is short.

One species only is known, a native of Cayenne and Brazil; it is the *TRACAXA* of Spix, (*P. tracaxa*, Bibr.) See engraving.

## GENUS CHELODINA.

Among the most remarkable of the genera belonging to the present tribe, is that termed Chelodina, of which three species are described. These animals, as far as the head and neck are concerned, remind us rather of a snake than a Tortoise. The head is very long and flat, and covered with a thin skin; the jaws are feeble; the mouth is wide; the neck is strangely elongated, and simply tuberculous; the carapace is depressed and oval; the plastron broad. The species longest known is the NEW HOLLAND CHELODINA, (*C. Novæ Hollandiæ*; *T. longicollis*, Shaw). See engraving.

This extraordinary Tortoise is a native of New Holland, and was first described by Shaw. It is said to be active in the water, and to prey upon various aquatic reptiles and fishes, which its long neck enables it to seize, as they approach near the place of its concealment in the mud, or among the vegetation of the pools or stagnant waters in which it dwells. It is a rare species, and seldom seen in collections.

The other two species are both natives of South America.

## GENUS CHELYS.

The genus Chelys is, in some respects, even more remarkable than the preceding. It includes but one species, the Matamata, to which we have already alluded, and which we shall now describe more fully.

The MATAMATA, (*Chelys matamata*, Dumeril; *C. fimbriata*, Spix; see engraving,) was first introduced to science by Bruguière, in the "Journal d'Histoire Naturelle, Paris," 1792. It is a native of South America; and the name we have adopted, is that given to it by the aborigines of Cayenne, where it was once very common, as it is still in various parts of Guiana. Its flesh is said to be highly esteemed, and its present scarcity at Cayenne is owing, according to Latreille, to this cause, an incessant warfare being maintained against it. During the day, according



MATAMATA.









NEW HOLLAND CHELODINA.

to the same author, it remains concealed, night being its feeding time and season of activity: and he also says, that its food consists of the herbage which grows on the borders of the rivers and lakes it frequents; adding, that the individual described by Bruguière was kept upon bread and vegetable substances. The Matamata, however, is not herbivorous, as this writer states, but carnivorous; it inhabits freshwater ponds and rivers, and conceals itself under the leaves of aquatic plants, with only the extremity of its nose, which is like a small proboscis, above the surface: in this position it awaits the approach of young birds, fishes, and small aquatic animals, which it seizes as they pass near it. It swims with rapidity, and darts eagerly on its prey.

In the character of the jaws, in the proboscis-like elongation of the nose, and in the soft and almost flexible condition of the carapace, this Tortoise evinces an affinity to the succeeding family, and may be regarded as an intermediate form between the marsh and river Tortoises.

The head is greatly depressed, and of a triangular figure, the nostrils being elongated into a sort of double tube, or proboscis; the mouth is extremely wide; the jaws are not covered with skin only, as has been supposed, but are protected by a thin sheath of horn. The eyes are small; the limbs are strong; the nails robust; the tail is short. Above the tympanum, or ear, is placed on each side a somewhat triangular membrane, and behind this, on the same line, along the neck, are four or five cutaneous appendages, with fringed edges: two pendant membraneous excrescences are immediately under the chin, and four of a larger size are placed across the throat, from the lower border of one tympanum to the other. The carapace is depressed, with a longitudinal keel down the centre, and a furrow along each side of it. The general colour of the carapace is dusky brown. When full grown, the Matamata is about two feet, six inches in total length, of which the carapace measures about fifteen or sixteen inches.

## RIVER, OR FLUVIATILE TORTOISES.

THOUGH this family of the Tortoises includes but few species, forming two genera, still it is distinct and well characterized.

Like the marine Tortoises, or Turtles, the species of this group are obliged, by their structure, to live continually in the water, where they swim with great facility, by the aid of the extended and almost flat surface of the carapace, and especially by means of their feet. These are flattened and extensively webbed, being, in fact, paddles not destined for progression on the ground, but for rowing the body through the water. The toes, however, as in the marsh Tortoises, are distinguishable, and are armed with claws; and here they differ from the Turtles, which have the feet fashioned into long, compressed oars.

The river Tortoises are, then, exclusively aquatic: they seldom come on the shore, or banks of the large rivers which they inhabit, and in which they pursue their prey. In the Turtles the neck is generally short; in these animals, on the contrary, it is extremely long, and capable not only of being retracted and extended with great rapidity, but of performing lateral undulatory movements, as we see in serpents. The head is narrow, and pointed before, the jaws have sharp cutting edges, but are covered with fleshy skin resembling lips. The nasal canal is prolonged into a short flexible tube or proboscis. In the Turtles the jaws are sheathed with strong horny beaks, and they feed mostly on vegetable productions, whereas the river Tortoises are carnivorous, feeding on fish, reptiles, and mollusea.

Not less marked are the differences between the river and the marsh Tortoises, though there is a gradual transition from the latter to the former, which cannot be overlooked. In none of the marsh Tortoises, however, is the carapace entirely destitute of horny scales, as in these animals; nor have any of them lips or folds of skin covering the cutting edge of the jaws. Still these two

families closely resemble each other in habits and manners ; for some genera, especially among the Pleurodera, reside almost constantly in the water, and feed upon living prey, which they pursue with cruel pertinacity. The Matamata, as already stated, is the immediate link between them : its manners and habits are the same, its carapace is broad and thin, its scales are flexible, its nostrils are tubular, the head is depressed, and the neck flattened. The essential characters of the river Tortoises are thus summed up by Messrs. Dumeril and Bibron : “ Tortoises with a soft carapace, a flexible and cartilaginous expansion forming the circumference of a centre of bone, by which it is supported ; the surface of this bone, which is nearly flat, is marked with inequalities, and is rough. The ribs are free at their ends, the head is narrow and elongated, and the nose terminates in a flexible proboscis ; the jaws are cutting, and furnished externally with folds of skin resembling lips ; the eyes are prominent, placed near together, and directed obliquely upwards. The plastron has its hinder portion short,



CARAPACE OF RIVER TORTOISE.



PLASTRON.

but is advanced anteriorly, so as to come under the neck. It is not entirely osseous, even in the centre, (see above engraving,) and it is united to the carapace by cartilage.

The tail is short and thick, the limbs robust, with large webbed feet: of the toes, three on each foot only are provided with nails, which are nearly straight, and channelled underneath."

Hitherto no species of the present tribe has been found in the rivers of Europe; all those which are known to naturalists, and of which the country is ascertained, are tenants of the rivers or large fresh-water lakes of the hotter regions of the globe; the Nile and the Niger in Africa, the Euphrates and the Ganges in Asia, and the Mississippi and Ohio in America.

It would appear, that some species of the river Tortoises attain to very great dimensions. Pennant speaks of individuals weighing seventy pounds: one which he kept for three months weighed twenty pounds; its carapace was twenty inches in length. As these animals swim at the surface, or float on the water, with the carapace exposed to the sun, and the plastron shielded from the direct rays of light, a marked difference exists between the colouring of the one and the other. The carapace is generally dark-coloured, and variegated with brown, black, or yellow; but the plastron, and all the under parts are pale. In this point they resemble the sole, the turbot, or the plaice, and other flat fishes.

We have said, that river Tortoises seldom come upon the land; they never search for food there; but the females seek the shore, in order to deposit their eggs; and it may be added, that during sultry nights, when all is still, and even during the day, if no danger is perceived, these animals assemble on small islets, on trunks of floating trees, or rocks jutting above the water, and there take repose; but they are very watchful, and at the sight of man, or upon the least alarm, they plunge into the water.

Their voracity is equalled by their activity. They pursue reptiles and fishes, and make great havoc among them; but being themselves highly esteemed by man as food, they themselves fall a prey to him. The usual way of taking them is by means of a line or hook, baited either



with a fish or frog, yet living, (for they refuse to touch dead or motionless animals,) at which they dart like a pike, and shoot out their long neck, while snapping at the prey, with the rapidity of an arrow. It is thus that they strike at the fishermen when captured; and as they bite most severely, always taking out the piece seized between their jaws, they are much feared; and for the sake of precaution, the men generally cut off their heads as soon as possible.

#### GENUS GYMNOPUS,

The first genus, *Gymnopus*,\* Bibron; (*Trionyx*, Geofrey,) is distinguished by the great breadth of the cartilaginous circumference of the carapace, and the narrowness of the plastron posteriorly. The body is greatly depressed; the cartilaginous circumference of the carapace is supported on each side by the free portion of the ribs, inclosed in its substance; but beyond the ends of these ribs the cartilage is continued without any osseous support.

As an example of this genus, we select the AMERICAN RIVER TORTOISE, (*Gymnopus spiniferus*, Bibron; *Trionyx ferox*, Auct.)

This formidable Tortoise is found in the rivers of Georgia and Florida, and in the great lakes both above and below the Falls of Niagara. Several specimens in Paris were brought from the Wabash, a river which joins the Ohio, a little before the junction of the latter with the Mississippi. In its native waters, the American river Tortoise reigns as a tyrant, and produces great havoc among the finny tribes; its voracity is very great, and it eagerly seizes a hook baited with a fish. When drawn ashore, it struggles desperately, and endeavours to bite, darting its head at its enemies with extraordinary rapidity. In the month of May, the females come on the banks, seeking for sandy spots exposed to the sun, in which to lay their eggs. These are globular and brittle; they are hatched in July.

It is not only to fishes that this Tortoise proves terrible;

\* Γυμνος, (*gymnos*,) naked; πους, (*pous*,) a foot.

it attacks small quadrupeds and aquatic birds, on which it darts with velocity from its lurking place; and even young alligators fall victims to its ferocity.

Besides the species described, there is another (*Trionyx muticus*, Lesueur,) which inhabits the same parts of America, and which was first discovered by M. Lesueur, who published a figure and account of it in the "Mémoires du Muséum."

Of the remaining species, one inhabits the Nile and other rivers of Africa, four the Ganges, one the Euphrates, and one the rivers of Java.

The *TRIONYX* of the Nile (*G. Ægyptiacus*) is much regarded in Egypt, from the services it renders in devouring the eggs and young of the crocodile.

#### GENUS CRYPTOPUS.

The next genus is denominated by M. Bibron, *Cryptopus*,\* and is characterized by the cartilaginous margin of the carapace being narrow, with small osseous plates above the neck, and behind the thighs; the plastron is broad, and capable of closing anteriorly, so as to shut up the retracted head and fore-limbs. Posteriorly the plastron is furnished with a cartilaginous valve on each side, for shutting in the hinder limbs, and a smaller valve for the tail.

Of this genus, two species are known, one from India, and one from Senegal. The *INDIAN*, or *GRANULATED CRYPTOPUS*, (*C. granosus*, Bibr.; *T. scabra*, Latr.) is a native of Pondicherry and Coromandel, where it lives in large sheets of fresh water, or lagoons: its flesh is eaten. Its habits and manners resemble those of the rest of this tribe.

#### IV. MARINE TORTOISES, OR TURTLES.

THE distinction between the marine Tortoises, or Turtles, and the terrestrial, or fresh-water Tortoises, whether tenanted morasses or rivers, has been long appreciated. In the whole structure of the marine Tortoises, we cannot

\* *Κρυπτιω*, (*crypto*,) to conceal; *πους*, (*pous*,) the foot.

but see an express adaptation for aquatic habits: the carapace is greatly flattened, and the limbs are modified into long oars, which, essentially adapted for the water, are but little fitted for much service on shore; indeed, when on the land, to which the females resort, in order to deposit their eggs, these animals shuffle along in the most awkward manner, and make with toilsome efforts only a slow progress. Very different are their actions the moment they regain the water; the strokes of their oars are vigorous, and most skilfully managed; they plough the waves, dive, and ascend with admirable address and rapidity, and remind the spectator of the easy movements of a large bird, sailing about in the air. The skull, in the present group, offers a peculiarity too remarkable to be passed by. It is vaulted over by a solid bony helmet, the result of a production of certain parts of the cranium, which being reflected, form a continuous envelope to the true skull, leaving a deep space intervening, which is filled by the temporal muscles. These muscles, thus protected and strengthened by an enlarged extent of attachment, act with great force on the lower jaw, which, as well as the upper, is short, and sheathed with horn.

The marine Tortoises, or Turtles, seldom leave the waters of the sea, except when they come ashore to deposit their eggs: it is, however, stated, that during the night they often visit the beach of desert islands, or clamber up the rugged slopes of isolated rocks in the open sea, for the purpose of feeding on certain plants to which they are extremely partial. They frequently wander to great distances; and in certain tranquil latitudes, seven or eight hundred leagues from land, Turtles are sometimes seen floating motionless, as if destitute of life: it is supposed that they are then profoundly sleeping, for they suffer themselves to be caught, and are roused to exertion only when it is too late to escape.

The power of diving, and of continuing under the water for a considerable time, is common to all the Turtles; nor will this appear surprising, when we consider the vast

extent of their lungs, the slowness of the circulation, and the imperfectly oxygenated condition of the arterial blood. The nostrils of the Tortoises of this family are not tubular, as in the river Tortoises, but are furnished with a valve, which closes them when the animal dives, and is capable of being raised, for the purpose of atmospheric respiration. This apparatus occurs, also, in the crocodile.

We have already said, that Tortoises have no definite voice, unless a forcible expiration of the breath may be so called ; it is, however, affirmed that some of the river Tortoises utter loud shrill cries ; and the Turtles, especially the species termed the Leathery Turtle, when wounded, utter piercing and discordant sounds.

Marine plants constitute the almost exclusive food of the Turtles ; but some, which exhale a musky odour, as the Hawk's-bill and Loggerhead Turtles, appear to feed also upon crustacea, and various mollusca, and particularly cuttle-fishes. According to Audubon, "the hawk's-billed species feeds on sea weeds, crabs, and various kinds of shell-fish, and fishes ; the loggerhead mostly on the fish of conch shells of large size, which it is enabled, by means of its powerful beak, to crush to pieces, with apparently as much ease as a man cracks a walnut. The Trunk (Leathery) Turtle feeds on mollusca, fish, crustacea, sea-urchins, (*echinus*,) and various marine plants."

In all the Turtles the jaws are robust ; the beak of the upper jaw is hooked downwards ; the edges are sharp, and sometimes saw-like ; the lower mandible is received into a groove of the upper ; the tongue is very fleshy and moveable.

It is among the species belonging to the present family that we find the giants of the Chelonian race.

Examples of the Leathery Turtle have been known to weigh fifteen or sixteen hundred pounds ; and other species have been observed weighing eight or nine hundred, with the carapace seven feet in length. In the countries where Turtles are common, and attain to very great dimensions, the natives use their carapaces as

canoes or boats, for coasting along the shore, as troughs to water cattle, as baths for children, and as roofs for huts. To these circumstances both Pliny and Strabo allude, in their notice of a nation called 'Turtle-eaters,' (*Chelonophagi*,) on the borders of the Red Sea; the custom, therefore, is one of considerable antiquity.

The members of the present family are met with in the warmer latitudes of the ocean, and especially towards the torrid zone. They abound on the shores of many of the West Indian islands, the Antilles, Cuba, Jamaica, Hayti, etc. They are numerous at the Cape Verd and Ascension isles; at the isle of France, the Seychelles islands, and Madagascar; at Vera Cruz in the Gulf of Mexico; at the Sandwich and Galapagos islands, and elsewhere. Stragglers frequently visit the Mediterranean, and occasionally the British shores.

The flesh of some species, but particularly of the Green Turtle, (*Chelonia Midas*,) is in the greatest request as a luxury for the table, at least in England, and the animal itself is an object of commerce. The arrival of a cargo of 'lively Turtles' is by no means a thing of trifling importance.

All the Turtles afford a considerable quantity of oil, which is employed for various purposes. In some of the West Indian islands it supplies, when fresh, the place of butter or salad oil, for culinary purposes, and it is also used for burning in lamps.

The eggs of most of the species are excellent, being both nutritive and agreeable to the taste; but the albuminous portion, or 'white,' as we commonly term it, does not acquire firmness by boiling.

We have already alluded to one species, the Hawk's-bill Turtle, (*Chelonia imbricata*,) of which the horny plates covering the carapace, and popularly known under the name of 'tortoise-shell,' are so valuable.

As the flesh of one species, and the shell of another are in such request, the former not only being demanded in England, to add to our luxuries of the table, but also

forming a useful and salutary portion of the stores, for the consumption of the crews of vessels engaged in the commerce of the tropical and southern seas, it follows that a regular system of warfare is kept up, at various places, against these tenants of the ocean. Numbers are annually captured, and thousands of eggs collected; and the young when hatched fall a prey, by wholesale, to sea-fowl, and various other birds, and to quadrupeds; nevertheless, the race is not perceptibly thinned.

It appears that Turtles have favourite breeding places, to which they regularly return, assembling at the proper season in multitudes, which have often travelled thither from vast distances.

Latreille states, that the troops of Tortoises which habitually frequent the Galapagos islands, situated under the line, migrate to the western coast of America, distant about two hundred leagues, in order to deposit their eggs; and that the Tortoises which reside near the shores of Africa, resort to the island of Ascension for the same purpose. Each species has its own period in which this important visit is performed; but it is always in the spring, or early part of the summer, and the males follow or accompany the females in their long voyage. The low sandy shores of small desert isles, or the flat coasts of larger islands, or continents, are their usual haunts; and night is the time in which they begin their operations. The place sought is beyond the mark of the highest tides; and hence these animals have often to drag themselves to a considerable distance inland, (comparatively speaking,) over a long, flat, sandy beach, left dry by the ebbing tide, but to be covered by its return. The following graphic account is from the pen of M. Audubon.

“ On first nearing the shore, and mostly on fine calm moonlight nights, the Turtle raises her head above the water, being still distant thirty or forty yards from the beach, looks around her, and attentively examines the objects on shore. Should she observe nothing likely



to disturb her intended operations, she emits a loud hissing sound, by which such of her many enemies as are unaccustomed to it are startled, and so are apt to remove to another place, although unseen by her. Should she hear any more noise, or perceive any indications of danger, she instantly sinks, and goes off to a considerable distance; but should every thing be quiet, she advances slowly towards the beach, crawls over it, her head raised to the full stretch of her neck, and when she has reached a place fitted to her purpose, she gazes all around in silence. Finding all well, she proceeds to form a hole in the sand, which she effects by removing it from under her body with her hind flappers, scooping it out with so much dexterity, that the sides seldom, if ever, fall in. The sand is raised alternately with each flapper, as with a large ladle, until it has accumulated behind her, when, supporting herself with her head and forepart on the ground, she with a spring from each flapper sends the sand around her, scattering it to the distance of several feet. In this manner, the hole is dug to the depth of eighteen inches, or sometimes more than two feet. This labour I have seen performed in the short period of nine minutes. The eggs are then dropped one by one, and disposed in regular layers, to the number of one hundred and fifty, or sometimes nearly two hundred. The whole time spent in this part of the operation may be about twenty minutes. She now scrapes the loose sand back over the eggs, and so levels and smooths the surface, that few persons on seeing the spot would imagine that any thing had been done to it. This accomplished to her mind, she retreats to the water with all possible despatch, leaving the hatching of the eggs to the heat of the sand. When a Turtle, or Loggerhead, for example, is in the act of dropping her eggs, she will not move, although one should go up to her, or even seat himself on her back; for it seems at this moment she finds it necessary to proceed at all events, and is unable to intermit her labour. The moment it is finished,



however, off she starts, nor would it then be possible for one, unless he were as strong as Hercules, to turn her over, and secure her."

It is at this crisis that the turtle-fishery is carried on: the flesh of the females is in the greatest estimation, and at this season it is supposed to be in perfection. At the close of the evening, when a fine moonlight favours the attack, the fishers station themselves along the shore, taking care to conceal themselves, and watch in silence the progress of the Turtles as they leave the water, and crawl along the beach. When the favourable moment arrives, the fishers suddenly advance, and despatch the Turtles with clubs, or turn them quickly over on their back, without giving them time to defend themselves, which they do by throwing with their paddles vast showers of sand in the faces of their assailants. In turning these creatures over it is often necessary to use levers, several men at the same time combining their strength. When once turned over, the flatness of the back prevents the Turtles from rolling round and recovering their position, and the paddles, which they flap with vain efforts, are now useless. If left to themselves, unless indeed the tide should reach them, they would perish.

A few skilful men in the course of three hours, may turn over, and thus secure forty or fifty Turtles; some of these are placed in certain inclosures, to be thence transported alive to Europe: others are killed and cut up, and the flesh, the eggs, and certain portions of the intestines, are salted and barrelled, ready for the ships which are in readiness to receive their cargo.

The turtle-fishers from the West Indies and the Bahamas, who catch these animals on the coasts of Cuba and its adjoining islands, particularly the Caïman islands, usually complete their cargoes in six weeks or two months: they then return to their own islands, or sail to different ports with their salted turtle, which is used as food, both by the whites and negroes. This salted turtle is in as great request in the American colonies, as the

salted cod of Newfoundland is in many parts of Europe; and the fishing is followed by all these colonists, particularly by the British, in small vessels, on various parts of the coast of Spanish America, and the neighbouring desert islands.

The Green Turtle is, also, often caught at sea in calm weather, during fine moonlight nights. Two men go together in a boat, which is rowed as silently as possible by one of them, whilst the other is provided with a harpoon, which he holds in readiness to dart at the unsuspecting animal. As soon as they discover a large Turtle rising to the surface, (the foam it spreads around betraying its presence,) they row hastily to the spot, and the harpooner launches his weapon with sufficient force to pierce through the shell into the flesh. To this harpoon is attached a line, which, when the Turtle dives, as it does instantly on receiving the wound, is given out, and by its means, when the animal is exhausted with its efforts and the loss of blood, it is hauled into the boat, or drawn ashore.

On the coast of Guiana haul-nets are employed for the capture of Turtles. The most extraordinary mode, however, of taking these animals, is that practised in the Chinese and Indian seas, and also on the shores of Mozambique. It is by the agency of certain fishes, which are, it may be said, trained to this work, or rather so managed that by availing themselves of the natural powers and instincts of these fishes, the boatmen secure their prize. To the fishes in question the name of 'poissons pêcheurs,' or fishing fishes, has been given.

The fact of this mode of catching Turtles was known to Columbus, (Gesner Conrad. *de Guaicano, seu reverso pisce Indico*,) and was verified by Commerson, who resided long in Madagascar, and whose manuscripts are in the Museum of Natural History of Paris. Middleton alludes to it in his system of geography, (Caffraria;) and Salt in his travels in Abyssinia.

The fish, which is thus employed, is one of the sucking

fishes, (genus *Echeneis*,) the upper surface of the head of which is provided with a curious apparatus, by means of which it is enabled to adhere to other objects with great tenacity. This apparatus, or sucker, is of an oval form, and bears a considerable proportion to the size of the whole animal. It is surrounded by a broad, loose, moveable rim, capable of applying itself closely to the surface on which it is placed. Within this rim is a double row of cartilaginous plates, or laminæ, each having a free edge, which is finely serrated. These plates are capable of being raised up, or drawn down flat; peculiar muscles upon the skull being adapted for the purpose. When the external rim is closely applied to any surface, and the cartilaginous plates, (lying flat in their ordinary position,) are raised up, the interstices become so many *vacua*, and the adhesion of the apparatus takes place, on the same principle as that of an exhausted cupping-glass.

The locomotive powers of these curious fishes appear to be comparatively inconsiderable; and hence they avail themselves of the exertions of other fishes, in order to be transported from place to place. They very often select the shark as their bearer, and attach themselves without fear to the sides of this tyrant of the deep; led by that instinct which teaches every creature how best to provide for its wants and safety. They are known, also, to fix themselves to the hulls of ships, and were once believed to be capable of arresting a vessel in full sail.

Having, in this short digression, explained the peculiarities of the sucking fish, something of the surprise, which our announcement of the employment of certain of the finny race in the capture of Turtles at first excited, is no doubt diminished, and our reader has already a clue to the plan. It is very simple. The people who adopt the method in question, have boats constructed with a sort of tank, or water-trough, in which several of these fishes are kept. To the tail of each is affixed a ring, to which may be secured a long, slender, but strong line.

Thus provided they set off in quest of their aquatic game. When they observe a group of Tortoises floating asleep on the water, they approach within a convenient distance, taking care not to disturb them; they then choose a fish, and tying the end of the line to its tail-ring, put it into the sea, giving it as much line as will reach to the spot where the Turtles are floating. Away swims the fish, drawing out the line to its extent; then, retained by the string, it sweeps round in a circle till it perceives the Turtles, towards which, wearied with its efforts, it immediately makes its way, and fastens itself upon one of them with great force. The boatmen now pull in their line, drawing both fish and turtle towards them; they then haul them on board, disengage the fish, and secure their booty.

Having thus explained the general characters of this marine group of Turtles, and their general habits, we may now proceed to the detail of genera and species.

#### GENUS CHELONIA.

The genus *Chelonia* is characterized by the carapace being covered with horny scales, and by one or two flat nails appearing on each paddle. This genus is divided into several minor sections, the first of which is represented by the GREEN, or ESCULENT TURTLE (*C. Midas*.)

The Green Turtle has the carapace somewhat heart-shaped, slightly elongated, and rounded above; it is of yellow colour, abundantly variegated with dark brown, and during life glazed over with a tinge of greenish. The vertebral scales are hexagonal, or six-sided.

As we have already alluded to the value of this species as an article of food, and explained its general habits, we have little further to say respecting it.

In shallow parts of the sea, near the islands and shores of continents within the intertropical latitudes, the Green Turtle is very common. When the sea is tranquil, it may be seen browsing at ease on the vegetation of its submarine pasture-grounds, associated in large troops, which

present an agreeable spectacle, and justify the poet in calling them the flocks of Neptune. They are even here, though out of the reach of man, very easily alarmed; and being formed for water-flight, they wing their way on the appearance of danger to a distant spot. Sometimes, flocks of these Turtles ascend the mouths of great rivers, where aquatic vegetation is abundant, and then, as if aware that they are within the precincts of an enemy's country, they become doubly watchful. They rise to the surface every minute, and, lifting up their heads, gaze around, in order to see if foes are approaching: the appearance of man puts them immediately to flight; the open sea being their asylum.

The number of eggs, which the female of the Green Turtle deposits every spring in the sand, is about two hundred, but scarcely does a thirtieth of that number of young Turtles, supposing every egg to be hatched, gain the sea, or live for a week after gaining it. The eggs are hatched in about twenty days, and on their first exit the young Turtles are from two to three inches in length: their colour is white, as if they were bleached, and the scales are not yet formed; yet even at this early age, guided by unerring instinct, they seek the sea, and feebly crawl towards it over the sandy shore. As hundreds of eggs are hatched at the same time, multitudes of young Tortoises may be often seen performing what to them is a long migration. In the mean time, their enemies are busy; birds, and beasts of prey are thinning their numbers; and crocodiles, and rapacious fishes are ready to seize upon those that escape the destruction on land, and gain the water. Thus, in providing for the continuance of its species, the Turtle provides a supply of food for other animals; the survivors of the slaughter being sufficient, not only to prevent the extinction of their race, but render it numerous, notwithstanding the havoc made by man.

We are not aware that this species has ever been seen on our coasts; but Latreille says, that one was thrown by a storm into the port of Dieppe, in 1752, and there

captured. It was six feet long, and weighed between eight and nine hundred pounds. Others, he states, have been taken near the mouth of the Loire.

The next section of the genus *Chelonia* is distinguished by the imbricated arrangement of the scales of the carapace, and is represented by the HAWK'S-BILL TURTLE, (*Chelonia imbricata*.) (See engraving.)

The Hawk's-bill Turtle, or the *Caret* of the French, (*Testudo Caretta*, of some authors,) has the carapace large, depressed, somewhat heart-shaped, and covered with broad scales, overlaying each other. The scales are thick, and firm; and are of a yellowish colour, variously stained, and marbled with brown: the vertebral row are keeled, and have a raised central line. The flesh of this Turtle is disagreeable, and, perhaps, even unwholesome; but its eggs are considered to be a great delicacy, and are largely collected; their use, however, is confined to the inhabitants of the countries on the shores of which they are deposited.

It is for the sake of the plates of its carapace, called 'tortoise-shell,' that this species is in request: it carries on its back the cause of its own destruction.

The Hawk's-bill Turtle is not only an inhabitant of the warmer latitudes of the seas and coasts of the New World, but is found also in the seas of Asia; and it was from the latter regions, that the ancients derived the tortoise-shell which they used in the arts, and for ornamental work, as is now practised in modern Europe and India.

The vertebral and costal scales of the carapace of this animal are thirteen in number, and these, instead of being united edge to edge, are imbricated, that is, the anterior scales largely overlay the next in succession, like tiles on a housetop; but the part of each that overlays the next, is thinner than the part adherent to the osseous framework of the carapace, and terminates in a rather sharp edge, so that the general surface of the whole is smooth. These are the valued parts of the animal, and



it is said, that the shell procured from the creature while alive is the finest.

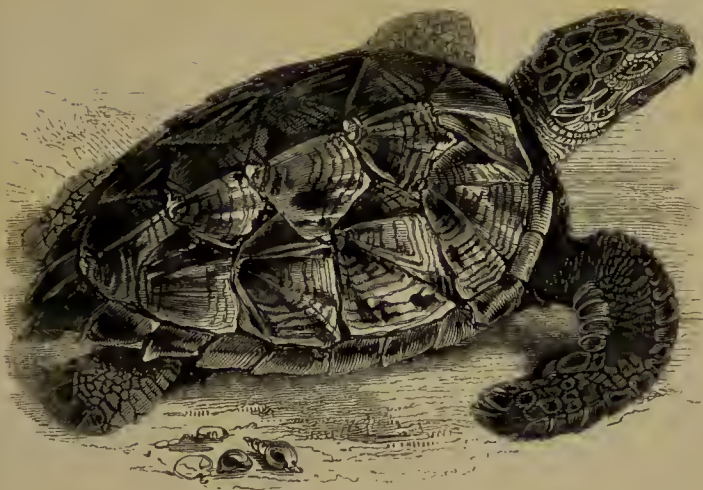
The mode in which the shell is separated from the bone of the carapace, is by presenting its convex surface to a glowing fire, which causes the scales to rise up and separate from the bone, to such a degree, that their complete detachment is easily effected. It appears that in Easter Island, and other places where the fishing of this species is carried on, the animal is subjected while alive to this barbarous operation, and that after being stripped it is set at liberty; the shell grows again, and it sometimes happens, that on a future year the same individual is re-captured, and subjected to a second ordeal; but the shell then obtained is very thin.

The coast of Darien, and several adjacent islets, are celebrated for the fishery of this Tortoise. At San Blass, a colony of indians is established for the sole purpose of taking these animals; and fifteen thousand pounds weight of shell is collected, on the average, annually.

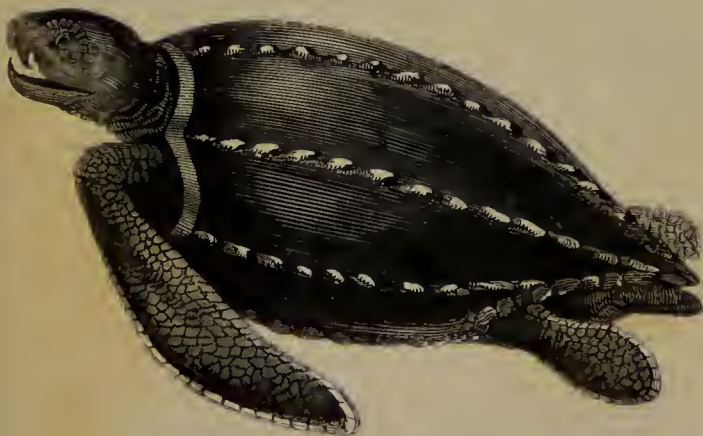
As the tortoise-shell, in its original condition, is in plates, many of our readers may have been surprised to find boxes, and various articles of a similar character, manufactured from this substance, and which appear to be cut out of a thick and solid body. A beautiful tortoise-shell snuff-box, for example, is now before us; it is thick, solid, and without any trace of joining, and appears as if carved out of a block of shining semi-transparent material. The mode of working tortoise-shell being very interesting, and but little known, the following account, taken from MM. Dumeril and Bibron's "*Épétologie Générale*," may not be unacceptable; it will at once explain the difficulty in the case of the snuff-box, and similar articles.

"The substance of the scale, considered as rough material, is unfortunately brittle, and liable to split; on the other hand, it possesses the most valuable properties. The fineness of its texture, its compactness, the admirable polish, and the carving which it is capable of receiving; the facility with which it may be moulded, its frag-





HAWK'S-BILL TURTLE.



LEATHERY TURTLE



ments soldered together, melted, or amalgamated by the aid of powder of the same material—these qualities give to it its value.

“The scales of the Turtle in question, when detached from the carapace, are bent in different ways; their thickness, besides, is not uniform, and often it happens that they are too thin, at least throughout a great portion of their substance.

“In order to straighten them, it is sufficient to steep them in boiling water for a few minutes, and then take them out, and place them between plates of metal, or smooth blocks of hard wood, leaving them to cool; great pressure being applied at the same time. They then retain the flatness desired. They are next scraped and filed; a smooth surface being obtained with as little loss as possible. When these shells, or scales, are brought to a proper thickness and size, they may be then used separately; but they are generally submitted to a still further preparation. When, for instance, they are too thin, or when they are not sufficiently long, or broad, the following processes are employed. In order to obtain single plates of great size, two are soldered together, the thin part of one being laid upon the thin part of the other; or, as is sometimes done, the edges of each plate are delicately bevelled, and fitted together. In each case, they are then put between metallic plates; to these a certain degree of pressure is given, which, when the whole is plunged into boiling water, is increased; and by this mode, they are so intimately joined together, that the slightest trace of their union cannot be detected.

“It is almost exclusively by the means of boiling water, that the effects upon tortoise-shell are obtained. The substance of the scales becomes so softened by the action of the heat, that it may be acted upon like a soft mass, or a flexible and ductile paste, which by pressure in metallic moulds will assume every variety of form required.

“The soldering of two pieces together, is effected by

means of hot pincers, which while they compress, at the same time soften the opposed edges of each piece, and amalgamate them into one. No portion of the scales is worthless; the raspings and powder produced by the file, mixed with small fragments, are put into moulds, and subjected to the action of boiling water; and thus made into plates of the desired thickness, or into various articles, which appear as if cut out of a solid block."

Such, then, is a summary of the mode in which tortoise-shell is worked: by means of heat and pressure, it can be made to assume any form; and thus it becomes manageable in the hands of the workman for the many purposes of use or luxury to which it is applied.

The food of the Hawk's-bill Turtle consists not only of marine plants, but also of crustacea and fishes; and hence, perhaps, the disagreeable flavour of its flesh. It never attains to so large a size as the Green Turtle.

There are a few instances on record, of this species having been captured on the British coasts, driven there undoubtedly by storms. Sibbald was in possession of the shell of one which came into Orkney. Dr. Fleming states, that an individual was captured at Papa Stour, one of the West Zetland isles; and in the year 1774, one was taken in the Severn, as affirmed by Dr. Turton, whose father placed it in his fish-pond, where it lived till the winter. In the "Magazine of Natural History," for March, 1840, we find the notice of a specimen taken on the 28th of January of the same year, at the mouth of the river Tor, in Devonshire. When first discovered it was in a very torpid state, and died ten days afterwards.

The third section of this genus is characterized by the plates of the carapace being fifteen in number, and not imbricated. The **LOGGERHEAD TURTLE** (*C. caouana*) is an example.

The Loggerhead Turtle attains to very huge dimensions; its head is thick, its jaws strong, the skin of the neck is wrinkled and rough, with scales; the form of

the carapace is oval, or somewhat heart-shaped, and has a marked central keel, and one on each side less elevated; the margin of the carapace presents saw-like points, formed by the projection of the posterior angle of each scale. The colour of the carapace is deep chestnut brown.

This Turtle is found in the warmer seas, and about the shores of the intertropical regions both of Asia and America. But its range is not limited to those latitudes; it is found, also, in the Mediterranean, and is taken abundantly near the shores of Sardinia and Sicily. Rondelet kept one for some time, which was taken on the coast of Languedoc; it occasionally emitted a loud hissing sound, produced by the forcible expiration of the breath.

The thinness of the scales of this Turtle renders them useless; besides, they are neither clear, nor beautifully coloured.

The Loggerhead feeds upon fish, mollusks, and the like, and its flesh has a most unpleasant flavour of musk. It is, therefore, never eaten, being both disagreeable and unwholesome; but, as the animal yields an abundance of oil, which may be used for various purposes, it is captured for the sake of that alone. Latreille states, that the oil is only employed in the preparation of leather, and for greasing the hulls of vessels.

As this Turtle is more carnivorous than the preceding species, so it is bolder, and more savage, and is said to attack even the crocodile, seizing him in such a manner, that he cannot turn upon his assailant, and defend himself with his teeth. We know, indeed, that the Loggerhead will defend itself with great resolution; its bite is very dangerous, as it always takes out the part it has got between its jaws, which are capable of crushing a conch-shell with ease; so that a man's hand would be mutilated at a single snap. As this species is not a vegetable feeder, it approaches the land less closely than the Green Turtle, excepting at the time in which the females deposit their eggs; and it is more frequently

met with out at sea, being often seen six or eight hundred leagues from any shore.

#### GENUS SPARGIS.

We now arrive at the last genus of the present family, namely, the genus *Spargis*. This genus has the osseous structure of the carapace and plastron covered, not with scales or plates, but with a thick layer of leathery skin, which in adult individuals is quite smooth, but which in young individuals is tuberculous. The paddles have no distinct nails.

One species only is known, namely, the LEATHERY TURTLE, or LUTE TURTLE, (*Spargis coriacea*.) The Leathery Turtle, or *Tortue luth*, of the French, (see engraving,) is one of the most extraordinary animals of the marine group of the Chelonia. In the circumstance of the carapace and plastron being covered with skin, it bears the same relation to the Turtles, as the *Trionyx* (*Gymnopus*) does to the marsh Tortoises; and, like the *Trionyx*, may be regarded as the representative of a separate section.

The muzzle of this Turtle is pointed, the form of the head, viewed above, being triangular; the jaws are of immense strength, and the upper has an acute, toothlike prominence on each side, with a deep indentation behind; while anteriorly a similar indentation, occupying the point of the jaw, separates these teeth from each other, as in the accompanying sketch, from Professor Bell's work on British Reptiles.



The lower jaw is sharp-edged, and turns up at its point, which, when the jaws are closed, is received into the central indentation of the upper.

The carapace is heart-shaped in form, and has seven longitudinal ridges, at equal distances from each other;



one runs down the middle of the carapace, and three are placed at regular intervals on each side; these ridges are slightly dentated, or notched, and between them the skin is smooth. The anterior paddles are twice as long as the posterior, but the latter are broader in proportion; the tail is short and compressed, and does not extend beyond the posterior point of the carapace.

The expression of the eye is very singular, from the almost vertical opening of the eyelids; and when the eyelids are closed, the edge of the posterior, or inferior, covers altogether that of the anterior, or upper.

The Leathery Turtle exceeds all the rest in magnitude. Examples have been seen, weighing from fifteen to sixteen hundred pounds; and many have been taken of seven and eight hundred weight. It is found in the Atlantic, the Pacific, and the Indian Oceans, and also in the Mediterranean. It annually visits the Tortugas, or Turtle islands of Florida, for the purpose of depositing its eggs; but arrives there, according to Audubon, later than the other species, and is less cautious in choosing spots for their concealment. The average number which it lays is said to be about three hundred and fifty, in two sets. Its food consists of marine plants, fishes, mollusks, echini, etc.

According to M. Latreille, this Turtle breeds on the desert and sandy shores of Barbary; still it is by no means common in the Mediterranean, nor does it often wander up the Adriatic, or through the sea of Marmora into the Black Sea. It has, however, been captured both on the shores of France and England. Rondelet saw one taken at Frontignan, which was five cubits long, (about seven feet, six inches.) Amoureux describes another, taken in the port of Cette, which was seven feet, five inches in length. Another was killed, in 1725, near the mouth of the Loire; it was nearly as large as the preceding, and was despatched by blows on the head with pieces of iron. The cries it uttered were so piercing, as



to be heard at the distance of a quarter of a league; and its throat exhaled an offensive vapour.

Mr. Bell gives the following account of those on record as having been captured on our coast. "Borlase, in his 'History of Cornwall,' mentions two of a vast size, which were caught in the mackarel nets, off the coast of Cornwall, a little after midsummer, 1756. The larger weighed eight hundred pounds, the lesser nearly seven hundred. Pennant states that a third, of equal weight with the first, was caught on the coast of Dorsetshire, and deposited in the Leverian Museum. This specimen, if I mistake not, is the one now in the British Museum.

"The late bishop of Carlisle informed me," proceeds Pennant, "that a Tortoise was taken off the coast of Scarborough, in 1748, or 1749. It was purchased by a family then resident there, and several persons were invited to partake of it. A gentleman, who was one of the guests, told them it was a Mediterranean Turtle, and not wholesome: only one of the company partook of it, who suffered severely, being seized with dreadful vomiting and purging."

A large specimen, in the possession of Mr. Bell, measures eight feet in total length.

This species was certainly known to the Greeks, and it was of its carapace that the first lyre, as is supposed, was formed. The fable, or allegory is, that Mercury found on the banks of the Nile, the back shell of a Tortoise, the flesh of which was consumed, and that to this he applied strings; thus the first lyre was fabricated. The seven ridges are said to have suggested the adoption of seven strings, which appear to have been the ancient number; in honour of which, Amphion built the seven gates of Thebes. We need not remind our classical readers, that *testudo* in Latin, and *χελύς*, (*chelys*,) in Greek, mean both a tortoise and a lyre, or lute.

Here we close our sketch of the Chelonia, or first order, comprising the Tortoises, terrestrial and aquatic

and we trust that we have not only explained their general characters, and the principal modifications of form which they present, in their adaptation for the land, the marsh, the river, and the ocean, but that we have, at the same time, adduced collateral evidence of the wisdom of God in creation. Every proof of design, that is, every instance of the adaptation of an organ to a given end, leads us immediately to God, demonstrating at once his power and goodness. Every animal in the fulfilment of its allotted part, for which it has due instincts and organs, may be said, and rightly said, to praise its Creator, inasmuch as it shows forth his wisdom and omnipotence. But to trace God in his works and ways, belongs to man alone. Let, then, the student of nature, rise from the creatures which he contemplates, and whose structures astonish him, to Him who is the Lord and Giver of life and light, and whose glory is in all His works.

## ORDER II.—SAURIA, OR LIZARDS.

THIS order contains a numerous assemblage of creatures, varying in size and power; from the terrible Crocodile, which lurks in ambush for its prey, to the harmless little Lizard, which shrouds itself beneath a withered leaf for concealment, or buries itself in the yielding sand. Not less remarkable is the diversity of form and habits which they display; nevertheless, they all agree in certain essential characters; which, as a preliminary, it is necessary to explain.

The general contour of the body is elongated; and the skin is protected, either by horny plates, by scales of various sizes and figures, or by granulations. In general, the limbs are four in number, and the toes are armed with claws. The body always terminates in a tail, which is frequently of considerable length. The eyes are protected by eyelids, excepting in certain instances; and in most species, a tympanic membrane covers the orifice leading to the internal organs of hearing. The ribs, unlike those we have contemplated in the tortoises, are distinct and moveable, and there is a sternum, or breast-bone, which does not occur in serpents. The jaws are armed with teeth, as in snakes, but the bones of the jaws are firmly united together, and not separable into distinct parts, as in the latter animals.

The eggs of the Sauria have a hard calcareous shell: the young undergo no transformation, as in the case of the newt and frog.

The tongue differs greatly in its form, and in the degree of freedom which it enjoys. In the Crocodile, for example, it is undeveloped, and scarcely to be distinguished from the general floor of the mouth, between the branches of the lower jaw. In other groups, it is broad, fleshy, and free only at its point: in the Chame-

leons it is fleshy, cylindrical, and capable of being projected to a great distance, and then completely retracted. In some genera, again, it is slender and deeply bifid, (or forked,) like that of a snake, and, when at rest, withdrawn into a sheath; while in others, it is flat, very moveable, and notched, or forked at the tip. In all instances, it is lubricated with a glutinous saliva; but it does not appear to be endowed with a high sense of taste.

In most of the Sauria, or Lizards, the body is so remarkable for its length and cylindrical figure, that, as Aristotle has observed, they resemble snakes with the addition of limbs. "Among all the Reptiles," says M. Bibron, "these alone, undoubtedly approach the nearest to Mammalia, both in the variety and rapidity of their different movements, especially if we compare their progression with that of Tortoises. There are, indeed, among the Sauria, species which enjoy many modes of progression; for they can creep, walk, run, climb, swim, dive, and even fly.

"Nevertheless, the elongated and heavy trunk of these Reptiles is not supported by the limbs without effort; they walk, in general, with constraint, and slowly, for the arms and thighs are short, slender, but slightly muscular, and directed outwardly; while the elbows and knees are too angular to support with ease the superincumbent weight. Still, however, notwithstanding this conformation, so faulty in appearance, (though not in reality,) they are capable of executing a great variety of movements, all bearing upon progression." The form of the tail, the length of the body, the conformation of the toes, and the shape of the claws, determine the character of these movements, and harmonize with the the general habits of the animal. Thus, for example, palmated feet, or feet which have the toes united together by intervening webs, indicate aquatic habits; and the more so, if in conjunction with this structure of the feet, the tail be laterally compressed, and strongly ridged

above; for, thus modified, it is capable of acting the part both of oars and rudder: we may mention the Crocodile as an example in point.

Toes of great length, in conjunction with a long, slender, conical tail, denote an exclusively terrestrial mode of life; and a residence more particularly in sandy arid places, such as dry plains, or stony deserts.

A broad, flattened form of body, toes expanded on their under surface, and furnished with retractile claws, as we see in the Geckos, announce the power of adhering to smooth bodies, of traversing walls, or ceilings, like a fly, or of resting there, fixed and motionless, for an indefinite length of time.

Where we see, as in the genus *Draco*, a broad membranous expansion on each side of the body, supported by elongated ribs, acting the part of stretchers, we may be sure that the animal is endowed with the power of taking long flying leaps, from branch to branch. In certain of the Mammalia, as the flying squirrels, and also the flying phalangers of Australia, we find a similar provision for sweeping through the air.

The pincer-like feet, and the prehensile tail of the Chameleons, afford a clue to the general habits and locomotive powers of these singular animals.

Thus, then, are the manners and movements of the Sauria denoted by the structure of the limbs, and the conformation of the body. As in the Mammalia, we have only to regard with attention the external character of any species, to arrive at a general estimate of the situation for which it is designed, and of its prevailing habits; whether the species be arboreal, or aquatic; a tenant of dry and sandy places, or of marshy lands; whether it be inert, or active, slow, or rapid, in its actions.

The hotter climates of the globe are great nurseries of the Sauria. In our northern latitudes, unless by becoming acquainted with them through the medium of works treating upon their history, or of museums where

collections of them may be inspected, we can form but an inadequate idea of the multitude and variety of these creatures, which tenant their favourite abodes. A very limited number of species, and these all of small size, inhabit our island, and the parallel and more northern countries of the adjacent continent. But, as we pass southwards, their number, specifically considered, increases; and among them, some occur of unexpectedly large dimensions, as, for example, that beautiful species, the Eyed Lizard, (*Lacerta ocellata*,) measuring sixteen or seventeen inches in length; and which is a native of Spain, Italy, and the south of France.

It is, however, on arriving at the borders of the inter-tropical latitudes, where nature displays her most varied forms, her most astonishing productions, that we enter upon the territories of the Sauria. Here we find them, not thinly scattered, but crowding their respective localities. We have not to search for them; they obtrude themselves upon our notice. They are in our path, and haunt even the abodes of man. They swarm among the trees; they lie motionless on the surface of the water, enjoying the hot rays of the sun; they cover banks, and walls, and crumbling ruins; and mingle their sparkling hues with those of the blooming vegetation amidst which they nestle.

“I am positive,” observes Bruce, “and I can say, without exaggeration, that the number I saw one day in the great court of the Temple of the Sun at Balbec, amounted to many thousands. The ground, the walls and stones of the ruined buildings, were covered by them; and the colours of which they consisted, made a very extraordinary appearance, glittering under the sun in which they lay basking and sleeping.”

The picture drawn by Bruce is not only applicable to the Temple of the Sun at Balbec, but to similar places also, throughout the whole of the warmer latitudes.

Like the snake tribe, the Sauria moult their cuticle during the spring, or summer, after which they appear



in brighter colours. During the winter they hibernate, at least in the more temperate regions, retiring to holes in the ground, or to the chinks and crevices of old walls, or trees, in which to pass the months of cold and famine. In the intertropical regions their retirement is less continuous, and can scarcely be termed hibernation; they may, perhaps, retire to their retreats for a brief period, but it does not appear that they sink into a state of torpor. In dry climates, as in Arabia and Egypt, where they abound in incredible multitudes, they seek their retreats only when the temperature is too low to be congenial; but do not truly hibernate: they may be seen at any season of the year, when a warm sun invites them to bask in its welcome rays.

None of the Sauria are poisonous, none have poisonfangs, though the ancients regarded many as venomous in the extreme. Of these an imaginary animal, which they termed the Basilisk,\* was especially celebrated. Our classical readers will remember Lucan's description of this Lizard, the fancied pest of the deserts of Africa.

“But fiercely hissing, through the poisoned air  
The basilisk exerts his deathful glare;  
At distance bids each vulgar pest remain,  
And reigns sole monarch of his desert plain.”

The light of knowledge has dispelled these errors, the fruits of ignorance and credulity; and with them, the unfounded belief in the medical properties at one time attributed to certain Lizards, which, in the pharmacy of the east, took the place of the Viper of our country, the flesh of which was formerly considered as useful in various diseases.

A belief in the medicinal properties of certain Lizards was not, however, confined to the east. One species, the Adda of the Arabians, (*Scincus officinalis*,) formerly obtained a place in the British materia medica; its flesh was supposed to be a restorative, and of great avail in

\* The title of *Basilisk*, or *Basiliscus*, is applied, by modern naturalists, to a genus peculiar to South America.



leprosy, and other diseases. It was one of the ingredients in that compound known as theriaca, or confectio damocratis; "the wild exuberance," as Dr. Lewis expresses it. "of medical superstition in former ages."

The opinion respecting the virtues of the Adda, was brought into the west from Arabia; and in Arabia it continued to prevail long after it had passed away in Europe. It is now, however, abandoned there. Bruce observes, that the El Adda is one of the few Lizards which the Arabs have in all times believed to be free from poisonous qualities, and yet to possess all the medical virtues so abundantly lavished upon the more noxious species; adds, that the character of these reptiles seems to be greatly on the decline in their native regions; for though the books prescribing them are in every body's hands, yet the medicine is not now made use of in the places where the books were written.

Though the Lizard race are destitute of medicinal properties, many of them, as the Iguanas, have long held, and still maintain, a high rank as articles of luxury for the table; and the flesh and eggs of the Teguxin, a large species of Brazil, and other parts of South America, are eaten.

In our survey of the Sauria, we shall mainly follow the arrangement instituted by MM. Dumeril and Bibron; using, however, terms more easily understood by ordinary readers, though less strictly scientific than those which the above naturalists have adopted.\* And, here,

\* A difficulty exists in framing family, or inclusive terms, in our language, which is not the case in the French. For example: the first family of the Sauria is termed *Les Crocodiliens*, or *Aspidiotes*. Now, the term Crocodiliens does not mean only Crocodiles, but also Gavials and Alligators, or Caïmans, and constitutes the title of a family, of which the Crocodiles form a prominent portion. To say Crocodiliens in our language, would be affectation; we must therefore say simply, Crocodiles, or use the Greek term, *Aspidiotes*, (*ασπιδιωτης*, one who wears a light shield, or buckler,) which we wish to avoid. We shall, therefore, be pardoned for the inelegance of such expressions as the "Crocodile family," the "Iguana family," and similar phrases; these, however, we shall accompany with a Latin term, which will be at once scientific, and agreeable to the ears of the scholar.

we must premise that, having a vast assemblage of genera and species before us, we can only attempt a broad outline; selecting from amidst the groups such species, by way of illustration, as are interesting, either from their habits, or their peculiarities of structure.

The class SAURIA, or the LIZARDS, may be divided into the following families:—

- I. The Crocodiles, or Crocodile family, (*Crocodylidae*.)
  - II. The Chameleons, or Chameleon family, (*Chamaeleonidae*.)
  - III. The Geckos, or Gecko family, (*Stellionidae*.)
  - IV. The Varans, or Varan family, (*Varanidae*.)
  - V. The Iguanas, or Iguana family, (*Iguanidae*.)
  - VI. The true Lizards, or Lacertine family, (*Lacertidae*.)
  - VII. The Chalcides, or Chalcides family, (*Chalcididae*.)
  - VIII. The Scinks, or Scink family, (*Scincidae*.)
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## I. FAMILY, CROCODILES.

THOUGH divided into three genera, the animals which form the present family, are all closely related to each other, and agree in the general details of their structure.

The body, in its figure, resembles that of a Lizard; it is depressed, and the back is protected by solid pieces of mail, or bucklers, of an osseous texture, with longitudinal elevated ridges; or by large osseous plates, ridged above, and disposed in longitudinal rows. The sides are covered with small rounded, or oval plates; and the under surface is sheathed with square, smooth, scaly plates, disposed in transverse rows.

The tail is long, tapering, thick at the base, and compressed at the sides, so as to serve as a paddle. Along its upper surface, ridged plates are continued from the

back, at first in four rows, which at length merge into a single row of ridges. The sides of the tail are covered with square scales.

The limbs are short; the fore feet have each five distinct toes, of which the two outermost are destitute of nails. The hind feet have four toes, of which the last has no nail; they are semi-palmated, or partially webbed. The head is flattened above, and the bones, which are rugged, are closely covered with a tough and almost horny skin; this skin is furrowed into compartments, like scales; and it also dips into the winding intervals, between the rugosities of the bone, so as to render them visible.

The teeth are numerous, thick, of unequal length, conical in figure, and hollow at the base; they are placed at a distance from each other, the intervals mutually receiving the teeth of the opposite jaw, when both are closed.

The eyes are small, but bright; the pupil is linear, and vertical. Besides the two external eyelids, there is a third, or inner eyelid, termed, *membrana nictitans*; this is a semi-transparent membrane, and is destined to protect the cornea, or surface of the eye from the water, during the animal's submersion.

Beneath the throat are two large glands, opening externally by very small orifices, and producing a sort of pomade, or unctuous substance, of a strong musky odour; its use is altogether unknown.

The nostrils have their external apertures close together, on the upper part of the muzzle; and they are furnished with a moveable valve, capable of being shut or opened; the nasal canals do not open into the cavity of the mouth, but into a post-oral cavity, divided from that of the mouth by a curious valve, which requires a more particular notice. At the bottom of the mouth, between the branches of the lower jaw, there is a broad elastic valve, stretching from side to side, and having its free edge upwards, and firmly and closely applied to a depending portion of the palate, brought down to meet

it. Hence, when the mouth of the Crocodile is opened, it appears as if there were no farther passage; as if, indeed, its posterior part were completely walled up, there being neither windpipe nor gullet visible. Walled up it really is, by this firm, elastic, moveable portion, which consists of a large cartilaginous expansion, (covered with skin,) of the *os hyoïdes*.

Anterior to it, and between the branches of the lower jaw, stretches forward a muscular space, covered with a yellowish skin, having numerous pores over its surface, whence exudes a viscid saliva: this part is analagous to the tongue, and is usually considered to be such, though it is incapable of being protruded. By its action, however, against the palate, the food is propelled along.

Now, as already stated, the nostrils open at the end of an elongated snout, and their internal orifices are behind the depending portion of the palate, and just over the opening of the windpipe; so that, provided the end of the snout be just above the water, the Crocodile may lie submerged all day in the water, with its mouth wide open, without the slightest inconvenience, and breathing all the while at ease. But, were the animal to lie with its closed mouth below the level of the water, the nostrils being just above, as it often does for days together, still would this valve be required; for it must not be forgotten, that these creatures have no lips round their jaws, by the compression of which the entrance of water into the mouth may be prevented; on the contrary, the teeth are all exposed in terrible array; and there is plenty of room in various small, irregular spaces between the jaws, even when closed, to admit the gradual ingress of the fluid, so that this valvular apparatus is in perpetual requisition.

What an express and admirable provision, then, is this gular valve for the Crocodile; a tiger-like reptile, which snaps up its prey in the water, which seizes water-fowl as they swim on the surface, or pursues fishes through the depth of the lagoon, or river; or which,

having grasped in its jaws a large animal, as a pig or a dog, on the bank, plunges beneath the water, in order to drown its victim! How fitted this contrivance to the habits of a ferocious animal, which lurks for days together submerged, with the exception of the nostrils, beneath the oozy fluid of weed-grown morasses, in order to spring upon the first animal that may come within its reach!

From what we have said, it will be easy to understand, that the process of breathing has, here, nothing to do with the mouth; but, it may be asked, how, with the back of the mouth thus closed, is the act of swallowing accomplished? As the Crocodile bolts its food in large pieces, or whole, the gullet being extremely capacious and dilatable, the act of swallowing is momentary. At this instant, the elastic valve is drawn down by the action of the muscles of deglutition, so as to leave, for the time, a free passage for the food to pass over it; which done, it returns to its former place.

In this respect, its action is analogous to that of the *epiglottis* in man and Mammalia. The *epiglottis* is a valve, which protects the orifice of the windpipe, over which orifice our food has to pass when we swallow it. Under ordinary circumstances, this valve, or *epiglottis*, is raised, and the orifice of the windpipe is open, in order that breathing may go on; but when we swallow, this valve closes over it, and thus, while it allows the food to pass, prevents any particle from entering the windpipe, and producing suffocation; an accident, which, as we know, occasionally occurs. In this case, however, the valve is ordinarily open; in the Crocodile it is ordinarily closed.

As the nostrils are valvular, so, for the same reason, is the external orifice of the ear defended by a valve. In all terrestrial Mammalia\* the orifice of the ears is open; in Lizards generally, the membrane of the tympanum,

\* In seals, the hippotamus, and a few others, the orifice of the ear is capable of being expanded or contracted, as necessity may require.

or ear-drum, is on a level with the scaly integument of the head, appearing like a thin horny plate. In the Crocodile, however, which has to endure the pressure of water, sometimes at a considerable depth, the orifice of the ear is guarded by a firm, moveable lid, capable of being raised or shut down at pleasure. Thus, while basking among the herbage of the bank, or floating on the surface of the water, the Crocodile may open the ear-valves, and listen for the footsteps of its prey; when beneath the surface, the valves will be closed.

In the stomach of the Crocodile, there are usually, or not unfrequently, found several stones of various sizes, which have been swallowed, as some suppose, to form a sort of ballast. Such an opinion is erroneous. The fact is, that the stomach of the Crocodile bears a close resemblance, both in its form and structure, to the gizzard of birds; and they, as is well known, swallow stones to triturate the food, and assist digestion; and, in the case of the Crocodile, a similar consequence may be the result. We have several times dissected young Crocodiles, which have been kept for a considerable period in confinement; and we have, more than once, found a quantity of Indian corn, (this having been within their reach,) unaltered in the stomach, doubtless swallowed in lieu of stones, which they could not obtain.

The Crocodiles are essentially carnivorous; they are tyrants by necessity; they are the scourge of the lakes and rivers in which they dwell: what the eagle is among birds, what the tiger or lion among Mammalia, such are they among the Sauria. Their principal food consists of fishes, aquatic birds, and such Mammalia as they can seize on the borders of the water: they employ both force and cunning in their warfare, or rather in the supply of their wants. Like all carnivorous animals, which have often to endure the long deprivation of food, their prey being scarce, these aquatic reptiles can fast for weeks, and even months without inconvenience;



but when opportunity serves, they glut themselves, and become indolent and half torpid.

It is when excited by hunger that the Crocodile displays its force and activity. Where a river enters a lake, or where a lake discharges its superfluous waters, there does the animal lurk, watching for fish; on which, as they pass, it darts with wonderful velocity. It conceals itself near the spot where animals come to drink, and suddenly rushes from its ambuscade upon them; in the same way it seizes water-birds, and often, also, catches them by swimming quietly under them, and then pulling them down by their legs. The prey, which is too large to be swallowed at once, it takes to its usual haunt; and it is said, that the Crocodile thus keeps a sort of larder, in which the game acquires that degree of putrescence which it relishes. Hence, floating carrion, and even the bodies of human beings, especially in the Ganges, where such are too common, are eagerly devoured.

Although sometimes carried inland by floods, the Crocodile seldom advances far on shore in pursuit of prey. On land it is by no means difficult to escape its attack, for the legs of the animal are ill-formed for running; and the vertebrae of the neck are so constructed, and fitted together, as to render a lateral motion difficult, and the turning out of a straight line not to be accomplished, without describing a considerable compass. Instances, however, sometimes occur, in which men are seized, being surprised before they have time to retreat. Mr. Watterton relates a melancholy account of a man being carried off by one of the Alligators of the Orinoko. The monster came upon the public walk, or *almæda*, rushed upon him, and bore him to the bottom of the river, before any assistance could be given. The same writer states, as a proof of the innate ferocity of these animals, that young ones, only a foot long, would furiously bite the arrows with which they were wounded; and snap at the archers with malignant fury.



It is in the month of April, or May, that the female deposits her eggs, the number varying from twenty to sixty. For this purpose she comes on the bank, or borders of the water, and chooses a sandy place, exposed to the sun; scraping a cavity for their reception, lining it with dry leaves, and carefully covering them with leaves and sand. The eggs are about as large as those of a swan, and covered with a parchment-like membrane. In about forty days the young are hatched, and are then about five or six inches in length. The female, who watches her eggs, conducts the young to the water, and supplies them with half-digested food, attending to them till they are able to capture their own prey. The male takes no part in the care of the young.

The Crocodiles are strangers to Europe, and hitherto no species has been found in Australia; they are all limited to the warmer latitudes of Asia, Africa, and America.

M. Bibron divides the Crocodiles into Caïmans, (*Alligator*;) Crocodiles proper, (*Crocodylus*;) and Gavials, (*Gavialis*.) The Caïmans, of which M. Bibron reckons five species, are all peculiar to America. The Crocodiles are divided between Asia, Africa, and America; two being natives of the latter. Only one Gavial is known, and this is peculiar to the river Ganges.

#### GENUS ALLIGATOR.

This genus is characterized as follows:—The head is broad; the muzzle short; the teeth are of unequal length; the fourth tooth of the lower jaw (counting from the fore point of the jaw) is the longest, and is received into a cavity of the upper jaw when the mouth is closed, so that it is concealed. The hinder limbs are rounded, and destitute of ridged scales; the webs between the toes are short.

The principal species belonging to this genus, Alligator, are the CAIMAN WITH BONY EYELIDS, (*Alligator palpeirosus*;) the PIKE-NOSED CAIMAN, (*Alligator lucius*;) and the SPECTACLED CAIMAN, (*Alligator sclerops*.)

The first is found in Cayenne and Brazil; the second is found in the rivers of North America. It occurs in



HEAD OF AN ALLIGATOR.

the Mississippi, as high as the Red River. Dumbar and Hunter met with an individual as far north as latitude  $32\frac{1}{2}$ , in the month of December, though the cold was rather severe. We have seen specimens from Carolina and Florida.

The PIKE-NOSED CAIMAN lives in rivers and lakes, and, according to Bartram, associates in troops, where fishes are abundant; and he has seen it in a stream of hot water, impregnated with vitriol. According to the same author, the female deposits her eggs in layers, separated from each other by partitions of mud. She watches them assiduously, and attends her young for two or three months after their exclusion. It appears from the observations of others, that this species never eats on the water; it drowns its prey, and then retires to its haunt in order to devour it. Its voice has some resemblance to that of a bull. It avoids the saltwater; and sleeps always with its mouth closed. In Louisiana, on the approach of winter, these Caïmans bury themselves in the mud, where they become stiff, without being frozen. So intense is their lethargy, when the cold is severe, that they may be cut deeply without being roused.

The SPECTACLED CAIMAN, (so called from a long ridge across the forehead, and another before each eye,) is a native of Cayenne, Brazil, and Paraguay. Spix, who observed this animal in the rivers Amazon and Solimoëns, informs us, that the female conceals her eggs in the woods bordering the water, and covers them with leaves; and that she watches them from the borders of the lake, or river, in which she dwells.

Its name in Brazil is Jacquare, or Jaquareçu. Azara states, that the natives of Paraguay term it Yacaré. It is abundant there, in all the rivers, lagoons, and pools. "It is commonly said, that the size attained by the Yacaré, is in proportion to that of the river or lake it inhabits; but it is a mistake to suppose that those inhabiting small lakes do not grow to the size of those inhabiting large sheets of water. And the reason why large individuals are not found there, is because they leave these small lakes for large rivers, or large lakes; where, as they increase in size, they meet with an adequate supply of food, such as fishes and ducks, which they seize, and swallow whole

"Although the Yacaré is little dreaded, and persons swim and cross the rivers without fear, yet these animals sometimes seize upon dogs, and live with them; and I do not doubt, but that they occasionally seize upon young persons, men, and various quadrupeds; but as it is known by experience, that this is not their common practice, I am inclined to think, that when such circumstances happen, it is because the places where their eggs are deposited are approached very closely.

"We well know, that these Caïmans attack persons who approach their nests, and would certainly destroy them, were not escape easy; for the Yacaré has not half the swiftness of a man.

"It is reported, that there are two species, one of a reddish colour, the other black; and that the former is scarce and ferocious. It will attack men who are swimming, as well as cattle and mules, while crossing

ivers. I have not seen this red Yacaré, and I suppose the accounts to be exaggerated." The red Yacaré, which Azara did not see, is, most probably, the *Alligator palpeirosus*, which is of a chesnut colour on the back, and of a light chesnut on the under parts. Young specimens are of a reddish or yellowish colour, more or less inclined to brown.

"The Yacaré is not found farther south than the 32nd degree of south latitude. In its habits, it is completely aquatic; and is never found, excepting in the water, or on the bank. When it seeks larger sheets of water, it waits for the season of great floods, the currents of which transport it with them.

"During the night, and indeed almost always, it lies below the level of the water, with only the surface of the head exposed; but towards the middle of the day, it comes upon the bank to bask in the rays of the sun.

"The eggs of this animal are white, rough, and as large as those of a goose; they are deposited, to the number of sixty, in the sand, and covered with dried grasses. The Indians esteem them as food; and also relish the white and savoury flesh of the Yacaré itself, although it is dry and coarse.

"In order to take this Caïman, the natives use a particular sort of dart, with which they aim at the flank, the only vulnerable part. When the dart enters, the iron head separates from the shaft, and the one being attached to the other by a long string, the shaft rises to the surface; by pulling at this, they know where the Caïman lies, and then, in a canoc, attack it with lances.

"The Spaniards are accustomed to amuse themselves with firing balls at this animal; but uselessly, as they can only penetrate the eyes or flanks; and, in either case, the Yacaré plunges to the bottom, and there remains. Sometimes they take a portion of the lungs of an ox, or sheep, and fix in the substance of it a picce of sharp-pointed wood, with a very long cord attached to it. They throw this bait into the water; and as soon as

the Yacaré seizes and swallows it, drag the animal by main force to the bank.

#### GENUS CROCODILUS.

The genus *Crocodilus* is distinguished from *Alligator*, by the sudden narrowness of the muzzle behind the



HEAD OF A CROCODILE.

nostrils, which produces a large notch, for the lodgement of the fourth tooth of the lower jaw, when the mouth is closed. In general, the posterior margin of the leg is ornamented with a series of ridged scales; and the hind toes, especially the three outermost, are joined by webs to their point.

Of this genus, two are indigenous in the new world. The *CROCODILUS RHOMBIFER* inhabits Cuba, and, perhaps, Mexico; the *SHARP-NOSED CROCODILE*, (*C. acutus*), is found in St. Domingo, Martinique, and, perhaps, in the country of South America between Camana and the Gulf of Darien. The other species are all peculiar to the old world. The *COMMON CROCODILE*, (*C. vulgaris*), is found in the Nile, the Senegal, in the Ganges, and along the coast of Malabar. The *HELMETED CROCODILE*, (*C. galeatus*), is found in Siam. The *TWO-RIDGED CROCODILE*, (*C. biporcatus*), occurs in the Ganges, in the rivers of Pondicherry, in Java, Timor, and the Seychelles isles. The



CUTRASSED CROCODILE, (*C. cataphractus*), is found in the river Galbar, near Sierra Leone, and, most probably, in the Senegal. Of one species, the Crocodile of M. Journée, (*C. Journei*), the country is unknown.

#### GENUS GAVIALIS.

The genus *Gavialis* is at once to be distinguished by the length and narrowness of the jaws, which are produced



into a straight, beak-like snout, armed with ranges of formidable teeth.

One species only is known, the GAVIAL OF THE GANGES, (*Gavialis Gangeticus*), one of the scourges of that celebrated river; and the dying Hindoo, exposed upon its bank, and the dead body consigned to its waters, become, not unfrequently, the food of this ferocious animal.

We shall conclude our history of the present race of Saurians, with a brief commentary, relating more particularly to the species inhabiting Africa and India; and bearing rather upon general, than specific details.

The Crocodile was known from the earliest periods, as far as the records of history conduct us; and every account tends to manifest the terror which its power and ferocity occasioned. Among that singular and idolatrous people, the Egyptians, it appears to have been one of the many animals to which they rendered religious homage. Herodotus observes, that "with some of the Egyptians the Crocodile is sacred; while others pursue him as an enemy. The inhabitants of the Thebais, and the shores of the lake Moeris, regard these creatures with the highest reverence. Each person rears a Crocodile, which

they train up, and suspend gold and jewels from its ear-lids, and adorn its fore feet with rings of gold. He is fed with the utmost care and delicacy upon bread, and the flesh of victims; and when he dies, he is embalmed, and placed in some consecrated repository.\*

“But the people who inhabit the territory of Elephantine, eat the Crocodile, which they consider not at all sacred. This animal is not called in Egypt, Crocodile,† but *Champsä*; for the former appellation was originally given to it by the Ionians, on account of its resemblance to a Lizard which they find in their hedges.”

It appears that the Coptic name, in modern Egypt, for a Crocodile, is *Temsa*; and either this term, or the old Egyptian, (*Temsa* being, doubtless, a mere corruption of *Champsä*, or, perhaps, the common way of pronouncing it.) M. Champollion believes, that he has discovered on ancient papyri, these letters, M.Σ.A.H., which he regards as consisting of the preposition M, *within*, and the substantive ΣΑΗ, *an egg*.

According to Strabo, in the city termed Crocodinopolis, (the city of Crocodiles,) afterwards called Arsinoë, there was a tank within a public edifice, kept by priests, whose especial charge was a chosen Crocodile, to which they gave the name of *Suchus*, or Soukis, ΣΟΥΚΙΣ; and M. Champollion informs us, that a deity among the Egyptians, with a Crocodile's head, and the body of a man, was also termed Souk.

One circumstance, narrated by Herodotus, is very remarkable; and, strange as it may seem, there is some reason to believe that it is not destitute of foundation.

\* In the British Museum, in the Museum of Paris, and elsewhere, mummies of young Crocodiles, obtained from their primitive repositories, in Egypt, after a lapse of more than 2000 years since their embalment, and still in perfect preservation, are to be seen; and M. Geoffroy St. Hilaire expressly notices one, the earlids of which were pierced for pendants.

† The derivation of the term Crocodile, (Κροκοδειλος,) as usually given, (namely, κροκος, *croeus*, saffron; and δειλος, *deilos*, fearful, that is, saffron-fearing,) is very unsatisfactory.



Frequenting, he says, the water so much, the inside of the mouth of the Crocodile is infected with *bdellæ*, (*βδella*), considered by most scholars to mean leeches; and he adds, that other animals avoid the Crocodile, excepting a small bird, called *trochilus*; which, when the crocodile seeks the shore for repose, opening his mouth to the western breeze, boldly enters within his jaws, in order to pick out, and devour these *bdellæ*; while the Crocodile, pleased with the service rendered, never molests its little benefactor.

The word *bdella*, (*βδella*), which signifies a sucking creature,\* has been supposed to mean a leech, as it probably does; but it may mean other sucking creatures also; and M. Geoffroy St. Hilaire, who, in the great French work on Egypt, has commented, with considerable learning, on the text of Herodotus, is induced to believe, that these *bdellæ* were a species of gnat, or dipterous insect; resembling those which, according to M. Descourtils, infest the mouths of the Caïmans in America, attaching themselves to the gums and palate, etc. The bird called *trochilus*, is supposed to be one of the plovers, or a species of *Charadrius*.

Herodotus, Aristotle, and Pliny, speak exclusively of the Egyptian Crocodile. Ælian, however, speaks of a species found in the rivers of India, and particularly of one inhabiting the Ganges; but he gives us no definite details.

In Rome, the Crocodile does not appear to have been known, or, perhaps, more correctly speaking, seen, till the edileship of Scaurus, and twenty-eight years before the Christian era. Augustus Cesar exhibited thirty-six at one time in the amphitheatre, which were encountered by gladiators, to the satisfaction of the Roman populace. Admiration of the works of nature was, most certainly, not one of the characteristics of the Roman people; rare and curious animals, indeed, were often

\* *βδella*, or *βδαλλω*, to suck.

exhibited publicly, but not for the purpose of giving information, or exciting a spirit of inquiry; no, they were devoted to slaughter, in an arena, where man ignobly fought with man, or with the wild beasts of the desert, either for hire, or by compulsion. We live in times when the "works of the Lord are sought out by all them that have pleasure therein," as objects worthy of our study and contemplation; and when the genial influence of true religion has humanized and refined society.

That the Israelites, who so long sojourned in Egypt, were well acquainted with the Crocodile, there cannot be a question. The sublime description of the Leviathan, in the book of Job, (ch. xli.,) evidently relates to this animal. "Canst thou fill his skin with barbed irons? or his head with fish spears? Who can open the doors of his face? his teeth are terrible round about. His scales are his pride, shut up together as with a close seal. One is so near to another, that no air can come between them. They are joined one to another. The arrow cannot make him flee: sling-stones are turned with him into stubble. He maketh the deep to boil like a pot: he maketh the sea like a pot of ointment. He maketh a path to shine after him; one would think the deep to be hoary." These descriptive passages are clear; they cannot be mistaken. The allusions to his scales, his teeth, and the impenetrable hardness of his mailed skin, on which ordinary weapons make no impression, are as correct as they are spirited. "He maketh a path to shine after him." Those who have seen the Crocodile, not slumbering like a log, but in pursuit of his prey, all bear testimony to the velocity with which he cleaves the water; lashing it with his tail, and leaving a "hoary" track behind. "He maketh the deep to boil like a pot." The enormous Crocodile, basking among the reeds near the shore, will sometimes suddenly dart out into the middle of the lagoon, or river, glaring with his eyes, swelling out his body to the utmost; and then whirl round and round, uttering a horrible noise, and

lashing furiously with his tail, till the surrounding water is worked into a foam: this ended, he darts away to his reedy covert, and lies inactive and motionless as before. Mr. Watterton describes the bellowing of the Alligator as commencing in a suppressed sigh, and then suddenly bursting forth so loudly as to be heard above a mile off. This may have given rise to the story of the Crocodile imitating the cry of a human being in distress, for the purpose of alluring a victim, which is altogether fabulous.

Though the Crocodile, as we have stated, was venerated in Thebais, it was not so in the territory of Elephantine; the inhabitants of which were accustomed to attack it, and successfully; for the stratagem of man is superior to the brute force of the mightiest of the lower animals. "Crocodile hunting," says Herodotus, "is here conducted in various modes; that which seems to me the most worthy of being described, is as follows:—Having baited a hook with the chine of a pig, the huntsman lets it down into the mid-stream of the river, while he stands on the brink, having with him a living pig, which he strikes; the Crocodile, hearing the cry, follows the sound, and meeting the chine, swallows it; the people then draw him ashore. When he is brought to land, the huntsman's first object is to blind his eyes with mud; and, if this be accomplished, the rest is easily managed; if not, his destruction is a work of difficulty." In Dongola, at the present day, the Crocodile is caught for the sake of its flesh, which is regarded as a delicacy. The mode pursued, closely resembles that narrated by Azara, in his account of the Spectacled Caïman.

It is thus described by Dr. Rüppell:—"The most favourable season for catching the Crocodile is the winter, when the animal usually sleeps on sand banks, enjoying the warmth of the sun; or the spring, after the pairing time, when the female regularly watches the sand islands, where she has buried her eggs. The native discovers the place; and, on the south side of it, (that

is, to the leeward,) he digs a hole in the sand, throwing up the earth to the side which he expects the Crocodile to take. There he conceals himself; and should the Crocodile fail to observe him, it comes to the accustomed spot, and soon falls asleep. The huntsman then darts his harpoon, with all his force, at the animal; for, in order that the stroke may be successful, the iron ought to penetrate to the depth of four inches, at the least, for the barb to be fixed fast. The Crocodile, on being wounded, rushes into the water; and the huntsman retreats to a canoe, with which a companion hastens to his assistance. A piece of wood attached to the harpoon, by a long cord, swims on the water; and shows the direction in which the Crocodile is moving. The huntsmen pulling by this rope, drag the beast to the surface of the water, where it is again pierced by a second harpoon.

“The skill of the harpooner consists, in giving the weapon sufficient impulse to pierce through the coat of mail which protects the Crocodile.

“When the animal is struck, it by no means remains inactive: on the contrary, it lashes violently with its tail; and endeavours to bite the rope asunder. To prevent this, the rope is made of about thirty separate thin lines, not twisted, but simply placed together, and bound at intervals of every two feet. The thin lines get between the teeth, or become entangled round them.

“It frequently happens, that the harpoons, by the pulling of the men, break out of the animal’s body, and it escapes.

“If I had not seen the fact with my own eyes, I could hardly have believed, that two men could draw out of the water, a Crocodile fourteen feet long; fasten his muzzle, tie his legs over his back, and finally despatch him, by plunging a sharp instrument into his neck, so as to divide the spinal chord.

“The iron part of the harpoon, which is used by the huntsman, is a span long; and formed towards the point

like a penknife, being sharp at the end, and on one edge. Beyond this edge there is a strong barb; while, on the back of the blade, a piece projects, to which the rope is fastened. This iron head is affixed to a shaft of wood eight feet in length.

“The flesh and fat of the Crocodile are eaten by the Barabras, or Berberines, who consider them excellent. Both parts, however, have a smell of musk so strong, that I could never eat Crocodile’s flesh without violent sickness following.

“The musk glands of the animal form a great part of the profit, which results from its capture; as the Berberines will give as much as two dollars for them, the unguent being used as a perfume for the hair.”

“In some of the rivers of Africa, the negroes are bold enough, and, indeed, skilful enough, to combat the Crocodile in his own element; and armed only with a sharp dagger, dive beneath him, and plunge the weapon in his belly. It often happens, however, that the combat is fatal to the man; and frequently his only chance of escape is to force his dagger, or if this be lost, his thumbs into the animal’s eyes with all his might, so as to produce great pain and blindness.”

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## II. FAMILY, CHAMELEONS.

THIS present family contains but one genus; namely, Chameleon.\*

### GENUS CHAMELEON.

This singular group of reptiles seems to stand isolated in the midst of the Saurian order. It has no immediate relationship with any other family; and, therefore, limited as it is, in a numerical sense, it cannot be

\* Most naturalists spell the word Chamæleo; we, however, prefer the spelling adopted, as being that used by Pliny. The Greek is *χαμαιλεων*.

merged into any other section, but must form one by itself. In placing it after the Crocodiles, we follow MM. Dumeril and Bibron; and, we may say, with them, that there is “no plausible reason for this arrangement,” excepting, that being as distinct from all other groups, as are the Crocodiles, it may as well succeed them, as be introduced elsewhere, to interrupt, perhaps, the series of links forming a continuous chain. The generic characters of the Chameleons consist in the tongue being cylindrical, wormlike, capable of being greatly elongated, and terminating in a fleshy tubercle, lubricated with a viscid saliva, (see figure;) in the surface of the skin being covered with horny granules, instead of scales; in the deep and compressed form of the body, which is surmounted by an acute dorsal ridge; in the tail being round, tapering, and strongly prehensile, (capable of grasping;) and in the parrot-like structure of the feet, which have each five toes, divided into two opposing sets, (three being placed outwardly, two inwardly,) connected together as far as the last joint, and armed with five sharp claws, as in the annexed sketch.



TONGUE OF CHAMELEON.



Besides the characters already enumerated, we may notice the following. There are no external marks of an ear; the internal organ of hearing being entirely concealed. The head is very large; and from the shortness of the neck, it seems as if set upon the shoulders. The upper part generally presents an elevated central crest, or casque; and a ridged arch is over each orbit to the muzzle. The mouth is very wide; the teeth are sharp, small, and three lobed. The eyes, though



in themselves large, appear extremely minute; the whole of the ball, except the pupil, being covered with skin, forming a single circular eyelid, with a central orifice. The furrow between the ball of the eye, and the edge of the orbit, is very deep; and the eyelid closely attached to the ball, moves as it moves.

Each eye has the power of motion, independent of its fellow; so that we may see the axis of one eye directed upwards, or backwards, while that of the other is in a contrary direction, giving a strange and most ludicrous aspect to the animal, in unison with its general contour, and slow movements.

The only part of the Chameleon, as Cuvier observes, which moves with quickness, is its tongue. The tongue of this animal, indeed, is not to be regarded as an instrument for ascertaining the flavour of objects; but for the prehension or acquisition of food. We have been accustomed to hear of the Chameleon feeding on air; this is an error not the less to be condemned, because it has the sanction of antiquity. The truth is, that the Chameleon lives on tolerably substantial diet, such as insects, slugs, and the like; and these it seizes, by means of its tongue, with noiseless and arrow-like rapidity of motion.

We have alluded to the general shape of this organ; we may here add, that, with the exception of the fleshy tubercle forming its tip, it consists of a hollow tube of great contractility; which, when withdrawn into the throat, is folded in upon itself, somewhat in the way in which a pocket telescope is shut up. When fully protruded, the tongue reaches to a distance, at the least equal to that of the animal's body. This organ, the structure of which has engaged the attention of many anatomists, is launched forth with inconceivable rapidity, to its full distance, and as rapidly retracted. An insect on a leaf, at an apparently hopeless distance, or a drop of water on a twig, disappear, as if by enchantment, before the Chameleon. The eye of the spectator

sees nothing definite; nor is any sound uttered, which the ear can appreciate.

From the structure of the feet, and the grasping power of the tail, which reminds us of the tail of certain monkeys in South America, it may be easily inferred, that the Chameleons are arboreal in their habits. They are, indeed, essentially climbers; slowly, and with cautious movements, they traverse the branches of the trees, among which they habitually reside; clinging with their tail, and grasping with their tenacious claws. They never go into the water; but they sometimes descend to the ground, where their actions are strange and awkward; the limbs being called in succession into use, and moved in an irresolute and groping kind of manner, before they are ultimately fixed.

The food of these creatures, as stated, consists of insects and their larvæ, etc. Without moving themselves, and perched on a branch, they watch for hours together their unconscious prey. The moment it stirs, the tongue is darted at it; it is caught, and swallowed in an instant.

It appears from Vallisnieri, that the females of this group, dig a hole in the ground for the reception of their eggs; and cover them with earth and dried leaves.

Every one knows, that the Chameleon is subject to remarkable changes of colour; and it has been asserted, that the animal assumes the colour of the object upon which it is placed, or which may be near it. As far as we have observed, this is not correct; and it has appeared to us, that these changes depended upon the influence of fear, anger, irritation, etc., on the nerves, which again modified the actions of the respiratory organs, and thus altered the state of the circulation. Light also produces decided effects; and the side of the animal exposed to the light, is generally darker than the other.

A few of the most remarkable of the changes in the colour of this reptile, as witnessed by ourselves, in numerous specimens which have come under our immediate notice may not be unacceptable. To say what is the

natural colour of the Chameleon, is rather difficult ; that which was most permanent in the animals we have seen, was a dull yellowish, tinged with a livid hue ; the latter prevailing more especially on the limbs. Sometimes, however, the universal colour was a straw yellow. When the animals were teased, or irritated, the lungs seemed to empty themselves, the sides collapsed, every rib became visible, and the colour changed to dark livid. When in good health, and enjoying the warmth of the sun, to which these animals are very partial, delighting to bask for hours in the genial rays, the yellow of the skin became changed into a delicate green ; but not always so, for sometimes the skin appeared spotted with yellow, upon a dull greenish grey ; and at other times, marbled with olive and straw colour. The changes were, in general, instantaneous, especially from a light to a dark tint ; at other times, the transition was more slow ; and this was the case, as it appeared to us, when the skin became marbled, or mottled. As night came on, the tints became more dull ; and the general hue was frequently a dusky olive, or a dark greyish brown, not unfrequently tinged with blue.

Dr. Weissenborn, who had for some months a Chameleon in his possession, says, that of all the circumstances connected with the variations of its colour, none struck him with more surprise than the difference between the tint of one side of the body, and that of the other. He attributes this to involuntary galvanic, or nervous currents, distinct from each other, independent of each other, and occupying separate halves of the body.

“The remote cause,” he says, “of the difference of colour in the two lateral halves of the Chameleon, may, in most cases, be distinctly referred to the manner in which the light acts upon the animal. The statement of Murray, that the side turned towards the light is always of a darker colour, is perfectly true : this rule holds good, as well with reference to the direct and diffused

light of the sun, or moon, as to artificial light. Even when the animal was moving in the walks of my garden, and happened to come near enough to the border to be shaded by the box edging, that side (so shaded) would instantly become less darkly coloured than the other. Now, as the light in these cases seldom illumines exactly one lateral half of the animal in a more powerful manner than the other; and as the middle line is constantly the line of demarcation between the two different shades of colour, we must evidently refer the different effects to two different centres; from which the nervous currents can only radiate, under such circumstances, towards the organs situated respectively on one side of the mesial line.

“Over these centres, without doubt, the organ of vision immediately presides; and, indeed, we ought not to wonder that the action of light has such powerful effects on the highly irritable organization of the Chameleon, considering that the eye is most highly developed. The lungs are but secondarily affected; but they are likewise more strongly excited on the darker side, which is constantly more convex than the other.

“Many other circumstances may be brought forward in favour of the opinion, that the nervous currents in one lateral half of the Chameleon are going on, independently of those in the other; and that the animal has two lateral centres of perception, sensation, and motion; besides the common one, in which must reside the faculty of concentration. Notwithstanding the strictly symmetrical structure of the Chameleon, as to its two halves, the eyes move independently of each other, and convey different impressions to their respective centres of perception. The consequence is, that when the animal is agitated, its movements appear like those of two animals glued together. Each half wishes to move its own way, and there is no concordance of action. The Chameleon, therefore, is not able to swim like other animals: it is so frightened, if put into water, that the faculty of concentration is lost,

and it tumbles about as if in a state of intoxication. On the other hand, when the creature is undisturbed, the eye which receives the strongest impression, propagates it to the common centre, and prevails upon the other eye to follow that impression, and direct itself to the same object. The Chameleon, moreover, may be asleep on one side, and awake on the other. When cautiously approaching my specimen at night, with a candle, so as not to awaken the whole animal, by the shaking of the room, the eye turned towards the flame would open, and begin to move, and the corresponding side to change colour; whereas, the other side would remain for several seconds longer, in its torpid and unchangeable state, with its eye shut."

According to Milne Edwards, two layers of pigment exist in the skin of the Chameleon, arranged in such a way, as sometimes to appear blended together, while sometimes one entirely conceals the other, the animal being light or dark coloured accordingly. The superficial pigment he states to be greyish or yellowish white; the deeper pigment of a violet hue. "Admitting," says Dr. Weissenborn, "that there are two pigments, of a dark or pale colour, contained each in a separate system of cells, by means of which M. Milne Edwards could make the colour of a piece of skin detached from the body change, by pressing the deeper pigment towards the surface, from yellowish grey to violet red; yet these pigments must possess the faculty of changing their hues, as no mechanical mixture of two given colours could produce those various tints which the skin of the Chameleon exhibits at different times, and among which I have observed the pure primary yellow, and red. By the anatomical discoveries of Milne Edwards, the solution of the question has, no doubt, been greatly advanced; but there are points which must be explained, before we can say that we understand the phenomenon.

"In availing myself of Milne Edwards' discoveries, so far as I think they are founded on fact, I am led by my own observations, to suppose that the layer of the skin



which contains the superficial, or whitish pigment, (exhibiting different tints under different circumstances,) always determines the general colour of the animal, when the animal is undisturbed, or torpid, in consequence of the absence of external or internal irritation. On the other hand, one or more hues, determined by the rising of the darker pigment, (likewise changeable,) begin to develop themselves. The change proceeds to a limit determined by the degree and manner in which the Chameleon is affected; the tissue containing the darker pigment stimulated, or the tissue containing the pale pigment depressed." After all, however, which has been written on this subject, much uncertainty still remains; many points have yet to be cleared up.

In captivity, the Chameleon has little in its habits or manners to attract, or please. It is dull and slow; its movements are languid; it seeks the warmth of the sun, and will bask for hours motionless in the rays. If kept during the summer months in a south window, it will not wander from it, but cling to the curtains, or attach itself to the stems of plants, and occasionally take food. During the winter, it is necessary to place the animal, covered with flannel, in a cage near the fire; or it may be set at large in a hot-house, or vinery. When lively, and in full health, the Chameleon will bite the fingers of those who touch it, and, though not so severely as to draw blood, with considerable force. Weissenborn's specimen, he says, died in a rabid fit, which lasted more than twenty-four hours; and during that time, the animal bit furiously at every thing which came within reach of its jaws, and would not quit its hold for many minutes.

Like all the Lizard tribe, the Chameleon is capable of enduring long-continued abstinence, apparently without injury: we have known individuals live for months without eating.

The species belonging to the genus *Chamæleon*, of which fifteen are described by naturalists, are all natives of the older continents, and most are African. The





COMMON CHAMELEON.



Common Chameleon is found, not only in Northern Africa, but also in the south of Spain. A variety of this species is peculiar to India.

The COMMON CHAMELEON, (*Chamæleon vulgaris*,) (see engraving,) was well known to the ancients; who, however, strangely distorted its history. It was supposed capable of changing its form, of assuming the colour of any object near it, and it was believed to feed upon air. These fictions were embellished by the poets, and hence it became the emblem of hypocrisy, or inconstancy. The engraving of this species correctly displays its form: the body is compressed; the back part of the head is elevated into a ridge, or casque; and the back is surmounted by a sort of keel, dentated at its commencement. The skin is covered with small, close-set granules. This animal is a native of Egypt, Tripoli, Algiers, and all the northern line of Africa, and also of the south of Spain. A variety inhabits India.

The THREE-HORNED CHAMELEON, (*C. tricornis*,) is a very remarkable animal, and is at once to be distinguished by a pointed horn, rising from the anterior margin of each orbit, and one on the top of the snout; the latter is the longest; and all are directed obliquely forwards. This species is a native of Fernando Po.

Another singular species is the FORK-NOSED CHAMELEON, (*C. bifidus*,) a native of the Moluccas, Bourbon, the continent of India, and also Australia. The top of the head (see annexed figure) is flat; and the muzzle is prolonged into two distinct branches, which are compressed and dentated along the upper, and under margins. The reasons for this strange formation are totally unknown. In its habits, the animal resembles the other species.



One of the largest of the present genus, the WARTY CHAMELEON, (*C. verrucosus*,) is a native of Madagascar. Its total length averages twenty inches.

As a detailed description of these and other species can only interest the professed naturalist, we shall pass over them, and proceed to our next family.

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### III. FAMILY, GECKOS.

THE Geckos are as clearly separable from the rest of the Sauria, as are the Chameleons, having characters which prevent their being confounded with any other group.

They are Lizards of an unpleasant aspect; but they do not attain to large dimensions. The head is broad and flat; the neck is narrow; the trunk is depressed, and thick; and the tail does not exceed the body in length. The limbs are short and stout; and the toes, which are nearly of equal size, are flattened and expanded on their under surface, either throughout the whole, or a greater portion of their length; and the dilated part, or the disc, is often marked with regular but minute plates, so ranged as to produce a striated surface. These discs act as suckers, which enable the animal to traverse walls, and even ceilings. Upon the variations which these discs, or expansions of the toes assume, most of the genera of this family are founded.

The nails are sharp, hooked, and retractile, like those of a cat; and, for the same reason, namely, that their points may be preserved from becoming worn or blunted. The tongue is fleshy, broad, but short, capable of but little protrusion, and notched at the tip, which alone is free.

The eyes are large, and full, with extremely contracted eyelids; which, as in the Chameleon, form only a single

membrane, leaving, however, a very large aperture, and exposing the *membrana nictitans*. The pupil, as in the cat, and other nocturnal animals, is linear, when undilated. The orifices of the ears are placed on the sides of the head; the tympanic membrane being considerably below the surface. The mouth is extremely wide; the teeth are small, equal, and compressed. The nostrils are placed laterally.

The skin is, more or less, covered with granulations, or horny tubercles; and a row of elevated pores is mostly continued along the inner side of each thigh. The voice of these reptiles is a sort of clucking cry, of which the term Gecko is an imitation.

With respect to the habits and manners of the Geckos, we may state that they are nocturnal; their food consists of insects and caterpillars, which they obtain by waiting in ambush for them, or by giving them chase, and pursuing them into the holes and crevices, where they retreat for refuge. Their feet, furnished beneath with imbricated suckers, adhere firmly to the surface of even the smoothest substances, permitting them to run with the greatest security over every object, and in all directions, to traverse ceilings, or suspend themselves on the under side of a leaf, while they watch the movements of their prey. The form of the claws, which are sharp, and hooked like those of a cat, give them the power of climbing the bark of trees with perfect facility, of penetrating the cavities and clefts of rocks, and of ascending walls, for the purpose of finding chinks or hollows, in which they conceal themselves during the day, resting motionless, and affixed by the feet, with the back downwards.

Their flattened, and very flexible body, when insinuated into small crevices, so adapts itself to them, as to deceive the eye; and this deception is farther strengthened, by the mingled dull tints of the skin, which blend and harmonize with the colours of the objects with which

the body is in contact. The skin of the Geckos is mostly of a grey or dull yellowish hue : in a few species, however, bright patterns ornament some portions of the body ; it is said, also, that tints of blue, red, and yellow may be perceived, which appear and disappear at the creature's will. Wagler states, that travellers have described to him certain species in India, which become luminous, or phosphorescent, during the night. It is only during this season that the Geckos are alert and active, in pursuit of such insects, as, like themselves, profit by the darkness, to come forth from their retreats in quest of food.

The appearance of the Geckos is far from being pleasing ; it is, indeed, forbidding : and hence, perhaps, the great aversion entertained towards them in the countries which they inhabit. They are regarded as being extremely venomous ; and, it is believed, that even their touch occasions malignant disorders of the skin. They are said, also, to infect viands of any kind, over which they may crawl in the night, rendering such provisions unwholesome, or even poisonous.

These, however, are errors, which take their rise in a perverted reasoning upon facts. When the Gecko is allowed to crawl over the skin, its footsteps are followed by redness, occasioned, principally, by the insertion of the points of its claws ; but partly, also, by the sucking action of the discs of the toes. To assign this redness to venom is natural among ignorant and superstitious people ; and, to suppose, that, as the skin becomes poisoned by the creature's touch, food over which it creeps must, therefore, become infected and dangerous, is a natural inference. There may be, however, as in the case of the toad, an acrid secretion from the skin of the Gecko, which may produce a slight irritation, in conjunction with the puncture of its claws.

Persecuted, however, as the Geckos are, they are partial to the habitations of man ; attracted, probably,



by the flies which also swarm there. They lurk in obscure corners, behind wood-work; or, amidst lumber of any kind, and only venture forth when night favours them. They are, then, all alert; their large eyes gleam, and their bright and fixed gaze seems to bid defiance to their enemies, whose movements they watch with remarkable boldness. It is useless to try to seize them; so abrupt and rapid are their actions, that when their capture seems certain, they are gone, and not to be found. In their quick escape not the slightest noise, or rustle is heard, so that they vanish as if by magic.

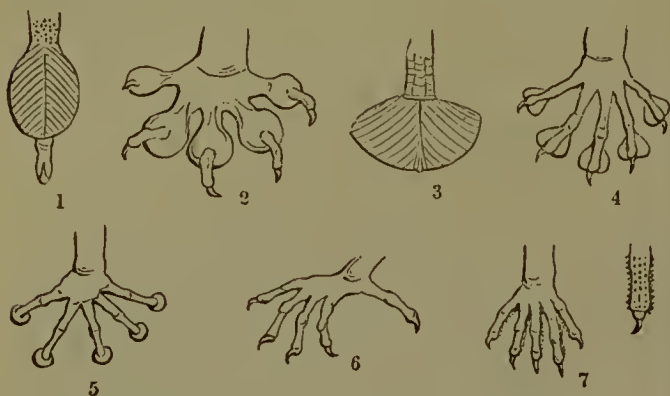
One species of Gecko, at least, was known to the ancients: Aristotle often notices it, under the title of *Ascalabotes*, (*Ἀσκαλαβωτῆς*.) By the Latin writers, from the time of Pliny, it was termed *Stellio*. Gesner, whose learning was of the first order, has brought together numerous passages from the ancient authors, by way of demonstrating that, under the names *Ascalabotes* and *Galeotes*, Aristophanes and Theophrastus have intended those small Lizards, or Geckos, which the Italians, in his own day, called *Tarentola*; and which are distinguished by a thick short body: they climb walls, and the sides of rooms, in search of spiders, on which they feed. Schneider, in a dissertation expressly on this subject, has fully proved, that the *Stellio* of Pliny is the Common Gecko.

We must not omit to notice a singular power, which the Geckos have of reproducing their tail, when lost by accident. The tail, indeed, appears to be brittle; and, when broken off, it is soon replaced; but a swelling at the base of the reproduced member marks its line of union.

M. Bibron divides the Geckos into seven genera, in which he nearly follows Cuvier. The genera are—

I. *Platydactylus*, (*πλατύς*, *platys*, flat; *δακτυλος*, *dactylus*, a finger.

In this genus, the toes are expanded, more or less, throughout their whole length; and furnished below, with minute transverse, imbricated laminæ; either entire, or, as in the figure, divided by a middle furrow. (Fig. 1.)



## II. *Hemidactylus*, (ἡμισύς, *hemisys*, half.)

In this genus, the base of four or five toes, on each foot, is expanded into a disc, from the middle of which rise the two last joints, which are slender. The under surface of this disc has imbricated plates, or laminæ, often in form like the Greek letter  $\Delta$ , or pyramidal. (See figure 2.)

## III. *Ptyodactylus*, (πτύον, *ptyon*, a fan.)

In this genus, the ends of the toes are expanded into a disc, notched in front, and imbricated beneath; the plates being disposed like the strips of an open fan. The claws are placed in a fissure, which is continued down the whole of the disc. (See figure 3.)

## IV. *Phyllodactylus*, (φύλλον, *phyllon*, a leaf.)

In this genus, the toes are dilated, at their extremity, into a somewhat triangular disc, with a simply flat, or

convex surface beneath ; but always divided by a longitudinal furrow, in which the nail is seated. (Fig. 4.)

V. *Sphæriodactylus*, (*σφαίριον*, *sphæron*, a rounded figure.)

In this genus, the toes are somewhat cylindrical, and destitute of nails ; at their tip, they are dilated into a small, circular, undivided disc. (Fig. 5.)

VI. *Gymnodactylus*, (*γυμνος*, *gymnos*, naked.)

In this genus, the claws are not retractile, nor are the toes dilated transversely ; the outermost, or fifth of the toes of the hind feet, is capable of being turned, at a right angle from the rest. (See figure 6.)

VII. *Stenodactylus*, (*στενος*, *stenos*, slender.)

The toes, in this genus, are cylindrical ; pointed at the extremity, jagged, or dentated along their edge, and with the under surface granular. (See figure 7.)

The Geckos, thus divided into the above seven genera, amount to nearly sixty species ; and are spread through Asia, Africa, and America, together with Australia. Two species are common to Northern Africa, and the most southern parts of Europe ; one belonging to the genus *Platydictylus*, the other to the genus *Hemidactylus*.

The WALL GECKO, (*Platydictylus muralis*, Bibron,) inhabits Barbary, Egypt, the islands of the Mediterranean sea, Greece, Italy, Spain, and the south of France. In Provence, it is called Tarente ; in Italy, Tarentola.

It is common among old ruins, and crumbling walls, or deserted buildings ; in the crevices and holes of which it hides by day. Sometimes it ventures within houses tenanted by man. Spiders and flies are its chief prey ; and, in the pursuit of these, it displays great energy. It has no pores on the thighs. The general colour of its upper parts is of an ashy grey ; sometimes, however

the back and upper surface of the tail are of a dark-brown, with greyish bands. The under parts are of a white colour, more or less pure.

The SMOOTH GECKO, (*P. theconyx*, Bibron, *Gecko lævis*, Daud,) is a native of South America, and all the Caribbee islands, where it is called “Mabouia des Bananiers.” Specimens in which the tail has been broken off, and replaced by another of imperfect growth, are very common in cabinets; and the figure assumed by the new tail in this species, has induced several naturalists to term it the Raddish-tailed Gecko, (*Gecko rapicauda*.)

The WARTY GECKO, (*Hemidactylus verruculatus*, Cuv.,) like the Wall Gecko, is a native of the countries bordering on the Mediterranean. It is found in Northern Africa, in the neighbourhood of Trebizond, in Greece, Sicily, Italy, Spain, and the south of France; and M. Bibron states, that a specimen belonging to this genus, has been brought, by M. D’Orbigny, from Chili, which so perfectly resembles this present species, as not to be distinguished from it. If M. D’Orbigny’s specimen be really identical with the Warty Gecko of Southern Europe and Africa, (which, did we not know the accuracy and discrimination of M. Bibron, we should not admit,) we have, in this instance, a remarkable exception to the general rule of geographical distribution.

As little is known, beyond the general details which we have given, of the habits and manners of the Geckos, we shall not attempt to enter into the minutiae of specific descriptions, which can only be useful to the professed student. We shall, therefore, pass on to our next family.

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#### IV. FAMILY, VARANS.

OF all the Sauria, next to the Crocodiles, the Varans attain to the largest dimensions; but, at the same time,

their figure is peculiarly graceful, and their actions are quick and alert: many are aquatic, swimming with ease and celerity.

These reptiles are covered with distinct, oval, granular scales, which are not imbricated; that is, they do not overlay each other, like tiles on a roof; but are placed closely side by side, and so arranged, as to form circular lines, or rings. The body is elongated, and rounded; the limbs are strong; the toes are distinct, very long, and armed with robust claws. The tail is more or less compressed, and at least twice as long as the body. There are no femoral pores. The head is pointed; the nostrils are lateral, but vary in distance from the muzzle. The eyes are large, and bright; the orifices leading to the internal organs of hearing, are very apparent, and seated low down on the skull, near the angles of the mouth; the tongue is fleshy, and very extensible, being, when fully protruded, twice as long as the head; it is of a slender figure, and deeply forked at the tip, like the tongue of a snake.

In the terrestrial Varans, the tail is nearly conical; but in the aquatic species, it is compressed laterally, and surmounted by a ridge, formed by two series of flattened scales. In these latter animals, the tail is a most important organ of progression in the water; they lash it rapidly and powerfully from side to side, and thus propel themselves along with great celerity, cleaving the water like an arrow. The body, in consequence of the air with which the lungs are filled, floats on the surface, and is directed by this powerful organ, at once a rudder and an oar.

On the ground, the Varans are active and quick: the toes are large and strong, and armed with sharp claws; and they are able, if not to climb trees, at least to scramble up rocks, and craggy precipices. The usual places of abode, of one section, are desert plains; of the other, the borders of rivers. They run with facility; but owing to the length of the tail, and the manner in which

they work it from side to side, pressing, at the same time, against the ground, their movements are sinuous, and resemble those of a serpent; and they are capable of springing upon their prey.

Although the pupil is circular, many are said to be nocturnal in their habits, pursuing their prey during the darkness of the night; others, however, are undoubtedly diurnal.

The food of these reptiles consists of the larger kinds of insects, as beetles, grasshoppers, locusts, etc., birds, eggs, and small mammalia. They often devour the eggs of Crocodiles, as well as those of aquatic birds; and Lizards, Tortoises, and fishes, fall victims to their ferocity. M. Dumeril, on the authority of M. Leschenault de Latour, confirms the accounts of travellers, who report, that they combine in attacking large animals. The latter naturalist states, that they unite themselves into packs, on the borders of lakes, or rivers, in order to seize upon such quadrupeds as unsuspectingly approach to quench their thirst. He has seen them hunt down a young deer, which was attempting to swim across a river, and succeed in drowning it; and, on one occasion, he found the bone of the thigh of a sheep in the stomach of an individual, which he dissected. It does not appear, that they ever attempt to injure man, unless previously molested by him.

The Varans are widely distributed; none, however, are natives of Europe, and one only, (*Heloderma horridum*,) is found in America, where it is a native of Mexico. The rest, or the True Varans, are respectively natives of Africa, India, the islands of the Indian Ocean, the Philippines, the Moluccas, Timor, etc., and of New Holland.

Of the terrestrial Varans, two species only are known; one peculiar to the island of Timor, (*V. Timoriensis*;) the other to Egypt.

The DESERT VARAN OF EGYPT, (*V. arenarius*, Bibr.,)



or Ouaran-el-hard of the Arabs, is about three feet in total length; it frequents the dry and sandy deserts, and feeds on insects and small animals. It is less active and savage than the aquatic species, and especially than that inhabiting the Nile; for, when kept in captivity, so far is it from darting on its prey with avidity, like the latter, that it refuses nourishment; and hence, in order to keep it alive, the food must be put by force into its mouth, and the animal must be constrained to swallow it.

The Desert Varan was known to the ancients, and is enumerated by Herodotus, among the animals of Lybia, who terms it, "a species of Crocodile, living on the land; not more than three cubits in length, and much like a Lizard." He gives, however, no particulars respecting it.

The head of this species is pointed at the muzzle; the orifices of the nostrils are oblique, and placed at a little distance before each eye. The teeth are moderate in size, sharp, and slightly compressed. The top of the head is covered with a mosaic work of flat scales, with several angles. The claws are very long, and compressed; the tail is nearly rounded for a considerable distance from its base; and towards its extremity, becomes slightly compressed at the sides. The colour varies in different individuals: some are of a pale brown, with dusky green spots, or bands; others are of a general yellowish tint. The claws are yellow.

Of the aquatic Varans, we may select the VARAN OF THE NILE, (*V. Niloticus*), as an example. (See engraving.)

This species attains to the length of five or six feet, and is very common in the Nile. It is also found in the Senegal, and in the Galbar, near Sierra Leone. This species, or one closely allied to it, is common in the rivers of Southern Africa; where it was seen by Levailant and Sparrmann. The latter traveller terms it, *Lacerta Capensis*. "One of this species," he says, "of the middle size, which, together with its two young

ones, I brought home with me, from Agter Brinties-hoogte, was about two feet long in the body, and three in the tail. Having caught her by the neck, so that she could not bite me, and finding that it required some strength to hold her fast, I got a large worsted needle, and gave her several punctures with it, not only in the heart, but in every part of the cranium which was in contact with the brain. This, however, was far from answering my purpose, which was to kill her in the most speedy and least painful manner, without mangling or mutilating her, that she seemed still to have life enough left to be able to run away. After this, my host undertook to put an end to her; and having given her several hard squeezes about the chest, and tied her feet together, hung her up by the neck in a noose, which he drew as tight as he possibly could. From this situation she was found, in the space of forty-eight hours, to have extricated herself, though she still remained near the farm; appearing, at the same time, to be almost entirely exhausted. Upon this, we tied her feet close behind her, so that with her long and sharp claws, of which she had five upon each foot, she could not damage the serpents and other animals, which I kept in a cask of brandy, and among which I put her with my own hands, holding her a long time under the surface of the liquor. Yet she was so far from being suffocated immediately, that she flounced about, and even a quarter of an hour afterwards, convinced us by her motions, that she had still some life remaining in her.

“This species of Lizard I found to be amphibious, living in water as well as on land, and likewise, that it grew to a still greater size; consequently, it appears to be an extremely long-lived animal; and, as well on account of this property, as of that of not being killed without great difficulty, to have an important office assigned it, in the general economy of nature. It was supposed, and not without foundation, by the people with whom I resided, that this creature might easily be made tame, and that



VARAN OF THE NILE.



it was not, in the least, of a malignant or venomous nature."

The Varan of the Nile appears to have been held in veneration by the ancient Egyptians, and is represented on their monuments. probably, says Cuvier, because it devoured the eggs of the Crocodile. Herodotus, however, makes no mention of it.

The general colour of the Varan of the Nile, is a greenish grey, mottled with black. On the back of the neck are four or five horse-shoe marks of yellow, one after another; and seven or eight rows of spots, of a yellowish green tint, extend from the shoulders to the root of the tail. The first half of the tail is ornamented with circular bands, composed of spots, like those on the back, and for the rest of its length, is ringed with greenish yellow. Before each shoulder runs a stripe of black. The under surface is whitish, with brown, transverse bands.

Dr. Smith describes a Varan, under the name of *V. albogularis*, which he discovered during his late African expedition. "Though no specimens of this species," he observes, "were obtained south of Lattakoo, yet there is reason to believe, that it occurs occasionally within the limits of the Cape colony. It is, in all probability, the animal called Das Adder, by the Cape colonists; and which is much dreaded, under the idea of its being very venomous. It is usually discovered in rocky places, or on low, stony hills; and when surprised, seeks concealment in the chinks of the former, or in the irregular cavities of the latter. When any inequalities exist upon the surface of the rocks, or stones, it clasps them so firmly with its toes, that it becomes a task of no small difficulty to dislodge it. Under such circumstances, the strength of no one man is able to withdraw a full-grown individual; and I have seen two persons required to pull a specimen out of a position it attained, even by the assistance of a rope round one of its hinder legs. The moment it was dislodged, it flew with fury at its enemies, who by flight only, saved themselves from being bitten."

Frogs, crabs, and small quadrupeds, form the diet of this Lizard; and, from its partiality to the former, it is often found among the rocks among which gush streams, and springs. This fact having been observed by the natives, it has led them to regard the animal as sacred; and not to be injured without danger of drought. This species grows to the length of five feet.

In leaving the Varans, we have to observe, that, under the term Monitor, most naturalists have comprehended both these Reptiles, and also a genus belonging, according to M. Bibron, to the True Lizards; and, to which group, he has referred it under the objectionable name of Salvator, in order, as he says, to avoid any confusion resulting from the adoption of the term Monitor, which has been employed to designate both the Varans, and the Safeguards, (*Sauve-gardes*.)

Cuvier states, that the name Safeguard, or Monitor, has been given to these animals, (that is the True Varans, and the other genus,) because some of the species are said to warn persons, by a hissing noise, of the approach of the Crocodile, or Caïman; but, he adds, that there is no sure foundation for this opinion.

While we follow M. Bibron, in applying the term Varanus to the present group, called Monitor, by Cuvier, we shall assign the term Teguxin, (a native name,) to the other genus in question, which belongs exclusively to America; and thus we shall equally avoid the confusion, which the use of the term Monitor would occasion

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## V. FAMILY, IGUANIANS.

THIS family, which takes its name from the Iguanas, a group of Reptiles which it includes, is very extensive; comprising about forty-six genera, and one hundred and fifty species.

All of these genera agree in certain primary characters.



The body is covered with horny plates, or scales, often keeled, spinous, or tuberculated; but never investing bony centres. With few exceptions, all the Iguanians have a horny crest, or ridge, extending along the middle line of the back and the tail.

The tongue is thick, fleshy, and spongy, or velvety, on its surface. It is not cylindrical; nor is it provided with a sheath, into which it can be retracted. Its tip is free.

The eyes are defended by moveable eyelids. The toes are free, distinct, and all furnished with nails, or claws. The auditory orifice is generally apparent, and often encircled by pointed scales.

MM. Dumeril and Bibron, divide the Iguanians into two sub-families.

The first sub-family is distinguished by the teeth being placed in a sort of furrow, running not on the ridge, but along the side of the jaw-bones, to which they adhere by the inner surface of their bodies, without being rooted into the bone itself. This section termed *Pleurodonta*, (*πλευρον*, *pleuron*, a side; and *ὀδους*, *ὀδοντος*, *odous*, *odontos*, a tooth,) is peculiar to America; with one exception, and this (genus *Brachylophus*) is Indian.

The second section has the teeth soldered to the ridge, or upper edge of the jaws, of which they appear to be a continuation, and from which they rise. There is, therefore, no lateral furrow. This section, termed *Acrodonta*, (*ακρος*, *akros*, the highest part, or summit,) is principally divided between Africa and Asia: Australia, however, has certain species; and one (*Stellio vulgaris*) is found in Greece, as well as in Syria, and Egypt. These two sections, or sub-families, then, are characterized by the difference of the mode in which the teeth are connected with the jaws. "These peculiarities of structure," says M. Dumeril, "present a remarkable concordance with the regions which these groups respectively inhabit. It is, however, to be confessed, that the disposition of

the teeth is not to be easily ascertained at once; for it is almost impossible to open the jaws of the animals while alive; and almost equally so, when preserved in spirits, after death. Besides, in order to ascertain the manner in which the crowns of the teeth are fixed, it is often necessary to cut away a portion of the gum, in order to lay bare the furrow, where it exists, or to become assured of its absence." Of the end to be answered, by the one or other of these characteristics, presented by the teeth in reference to the jaws, nothing is known. Nor can we assign any reason why the Iguanians of the old world, and of the new, should exhibit the structural differences alluded to; since, in other respects, they are related to each other.

In selecting the genera and species, as examples of the two sections, Pleurodonta and Acrodonta, we shall be influenced by the interest which attaches to them; and by their being generally to be seen in the museums of London.

## I. PLEURODONTA.

Of the genera belonging to this section we may first notice that termed *Polychrus*.

### GENUS POLYCHRUS.

In this genus, neither the back nor the tail have any ridge or crest; but the skin of the throat forms a hanging fold, or dewlap, with anterior indentations. The general figure is slender; the tail is of great length, but not prehensile. The head is pyramidal and elongated; the nostrils are lateral; the auditory orifice is covered with a tympanic membrane. Besides the usual teeth, a little row of teeth is placed along each side of the palate. The scales are ranged like tiles, and keeled. A line of small pores runs down each thigh.

The animals of this genus possess the singular property of changing their colour, as rapidly as the Chameleons, to which, indeed, in certain structural points,

may bear considerable resemblance; namely, in the magnitude of the lungs; and in the last, or false ribs, forming entire circles round the body.

In their habits, these Lizards are arboreal. Their food consists of insects; and they are quick and active.

The best known species, the MARBLED POLYCHRUS, (*P. marmoratus*), is spread over the greater portion of South America, and is common in Guiana and Brazil. It lives among the branches, where it pursues its insect prey. It would appear, however, from the observations of M. Bibron, that insects are not its exclusive diet; for he has found in the stomachs of specimens dissected by himself, fragments of flowers, mingled with the remains of beetles. It is not improbable, however, that in seizing insects resting on flowers, both flower and insect were swallowed together, the former being taken rather by accident, than purposely.

The general colour of this Lizard, as seen in specimens preserved in spirits, is of a chesnut brown, varying in intensity. On the back are, generally, four or five triangular marks of yellow, edged with black; and, sometimes, the intervals between these marks are spotted also with yellow. On each side of the head, five or six black streaks radiate from the eye. The tail is irregularly ringed with deep brown; and marks of this colour are also scattered over the limbs. A green tint sometimes prevails over the head, sides, and limbs.

#### GENUS ANOLIS.

The genus *Anolis*, which comprehends several elegant little Lizards, exhibits a character in the structure of its feet, found in no other group, except the Geckos. The under surface of the last joint but one of each toe, is dilated into a somewhat oval disc, finely laminated, and acting as a sucker. The skin of the throat forms a pendulous dewlap, capable, however, of being distended with air, when it assumes the form of an inflated sack

In some species, both the back and the tail are destitute of a ridge or crest; in others, on the contrary, a crest runs along the middle line of the back, and sometimes, also, along the tail, and consists of compressed scales. In some species, the tail is compressed; in others only slightly so, or even rounded. There are two rows of teeth on the palate, in addition to the ordinary teeth. The nostrils are small. The tympanic membrane is more or less below the level of the external auditory orifice, which is simple, and often very small. There are no pores along the thighs. The limbs are formed for activity.

Like the Chameleons, and the species of the genus *Polychrus*, the animals have the faculty of changing their colour; especially during warm weather; and it is said, both quickly and decidedly.

Of small size, and easily concealed by the foliage, amidst which they find shelter, these active and quick-eyed Lizards, easily elude observation. They live habitually on trees, climbing the branches with great address; and even resting on the leaves, secured by the discs with which their toes are provided.

Insects form their exclusive food, and these they pursue with great eagerness. The males are said to make a barking noise, like that of a small dog, and to curl the tail over the back, while running.

One of the best known species of this genus, is the RED-THROATED LIZARD, (*Anolis chloro-cyanus*, Bibr.; *Lacerta viridis Jamaicensis*, of Catesby.)

This beautiful little *Anolis* is a native of the West India islands. Its colour is green, more or less tinged with blue. There is no dorsal crest; the tail is large, strong, and slightly depressed at the base, its remainder being slender, and slightly compressed; a minute dentated ridge runs along its upper surface. The scales on the back and sides are very small, somewhat oval, and granular, and of equal size; they are not imbricated; those on the under parts are smooth, and overlay each

other. When irritated, the throat swells, and becomes as red as a cherry.

Like the rest of these animals, this watches for its insect prey, upon which it darts with extraordinary celerity; its fine burnished green gleaming brilliantly in the sun, as it glides along. A circumstance relating to this Lizard, as detailed by Mr. Bell, proves that both this and other small species are occasionally exposed to danger, from their attacks upon the more powerful insects, or upon such as are endowed with noxious qualities. "Some years since," he writes, "I had two living specimens of the beautiful little green Anolis, of the West Indies. I was in the habit of feeding them with flies and other insects, and having one day placed in the cage with them, a very large garden spider, (*Epeira diadema*,) one of the Lizards darted at it, but only seized it by the leg. The spider instantly ran round the creature's mouth, weaving a very thick web round both the jaws, and then gave it a severe bite on the lip, just as this spider usually does with any large insect, which it has taken. The Lizard was greatly distressed, and I removed the spider, and rubbed off the web, the confinement of which appeared to give it great annoyance; but in a few days it died, though previously in as perfect health as its companion, which lived for a long time afterwards."

#### GENUS AMBLYRHYNCHUS.

We may now pass to the genus Amblyrhynchus, which is characterized by the scales of the body being tuberculated; the skin of the throat dilatable, but not formed into a dewlap; the tail compressed at its extremity, and covered with large scales; a row of femoral pores, and a high crest along the back and tail. The toes are stout and short; the head is short, with a blunt muzzle; and the nostrils are placed laterally; the auditory orifice is small, and closed by the tympanic membrane.

Two or three species only are known.

The *AMBLYRHYNCHUS CRISTATUS* was first described by Professor Bell, in the "Zoological Journal," from a specimen in his possession, and stated to have been brought from Mexico. It is, however, common in the Galapagos islands, where it was seen by Mr. Darwin, ("Voyages of the Adventure and Beagle," vol. iii.,) whose description of its habits is very interesting. Referring to Mr. Bell's observations, that, "on a comparison of this animal, with the True Iguanas, the most striking and important discrepancy is in the form of the head;" which, instead of being long and pointed, is short, with an obtuse muzzle, and less long than broad; the mouth, consequently, being only capable of opening to a very short space; and that, from these circumstances, and the equality of the toes, and the strength and curvature of the claws, we may infer some marked peculiarity of habits and food; Mr. Darwin adds—"The following account will show with what judgment Mr. Bell foresaw a variation in habit, accompanying a change in structure.

"This Lizard is extremely common in all the islands of the Galapagos archipelago. It lives exclusively on the rocky sea-beaches; and is never found, at least I never saw one, even ten yards on shore. It is a hideous looking creature, of a dirty black colour, stupid and sluggish in its movements. The usual length of a full grown one is about a yard; but there are some even four feet long. I have seen a large one, which weighed twenty pounds. On the island of Albemarle, they seem to grow to a greater size than on any other. These Lizards were occasionally seen some hundred yards from the shore, swimming about; and Captain Collnett, in his voyage, says, they go out to sea in shoals to fish. With respect to the object, I believe he is mistaken; but the fact, stated on such good authority, cannot be doubted.

"When in the water, the animal swims with perfect ease and quickness, by a serpentine movement of its body, and flattened tail; the legs, during this time,



being motionless, and closely collapsed on its sides. A seaman on board sank one, with a heavy weight attached to it, thinking thus to kill it directly; but when, an hour afterwards, he drew up the line, the Lizard was quite active. Their limbs and strong claws are admirably adapted for crawling over the rugged and fissured masses of lava, which every where form the coast. In such situations, a group of six or seven of these hideous Reptiles may oftentimes be seen on the black rocks, a few feet above the surf, basking in the sun, with outstretched legs.

“ I opened the stomach of several ; and, in each case, found it largely distended with minced sea-weed, of that kind which grows in thin foliaceous expansions, of a bright green, or dull red colour. I have not observed this sea-weed in any quantity on the tidal rocks ; and, I have reason to believe it grows at the bottom of the sea, at some little distance from the coast. If such is the case, the object of these animals going out to sea is explained. The stomach contained nothing but the sea-weed. Mr. Bynoe, however, found a piece of a crab in one ; but this might have got in accidentally, in the same manner as I have seen a caterpillar, in the midst of some lichen, in the paunch of a Tortoise. The intestines were large, as in other herbivorous animals.

“ The nature of this Lizard’s food, as well as the structure of its tail, and the certain fact of its having been seen voluntarily swimming out at sea, absolutely prove its aquatic habits ; yet, there is, in this respect, one strange anomaly, that, when frightened, it will not enter the water.

“ From this cause, it is easy to drive these Lizards down to any little point overhanging the sea ; where they will sooner allow a person to catch hold of their tail, than jump into the water. They do not seem to have any notion of biting ; but when much frightened, they squirt a drop of fluid from each nostril.

“One day I carried one to a deep pool left by the retiring tide, and threw it in, several times, as far as I was able. It invariably returned in a direct line to where I stood. It swam near the bottom, with a very graceful and rapid movement, and occasionally aided itself, over the uneven ground, with its feet. As soon as it arrived near the margin, it either tried to conceal itself in the tufts of sea-weed, or entered some crevice. As soon as it thought the danger was past, it crawled out on the dry rocks, and shuffled away as quickly as it could. I several times caught this same Lizard, by driving it down to a point; and though possessed of such perfect powers of diving and swimming, nothing would induce it to enter the water; and, as often as I threw it in, it returned in the manner above described.

“Perhaps, this singular piece of apparent stupidity may be accounted for by this circumstance, that this Reptile has no enemy whatever on shore; whereas, at sea, it must often fall a prey to the numerous sharks. Hence probably, urged by a fixed and hereditary instinct, that the shore is its place of safety, whatever the emergency may be, it there takes refuge.

“During our visit in October, I saw extremely few small individuals of this species, and none, I should think, under a year old. From this circumstance, it seems probable, that the breeding season had not commenced. I asked several of the inhabitants, if they knew where it laid its eggs; they said, that though well acquainted with the eggs of the other kind, (namely, of the following species,) they had not the least knowledge on this part of the history of this aquatic kind; a fact, considering how common an animal this Lizard is, not a little extraordinary.”

Besides this species, a second is found in these islands and is termed, *AMBLYRHYNCHUS SUBCRISTATUS* by Mr Gray. (“Zoological Miscellany.”)

This species is terrestrial in its habits, and, unlike the last, "is confined to the central islands of the archipelago; namely, to Albemarle, Barrington, and Indefatigable. To the southward, in Charles', Hood, and Chatham islands, and to the northward, in Tower's, Bindloe's, and Abington, I neither saw nor heard of any.

"In the central islands, they inhabit both the higher and damp, as well as the lower and sterile parts; but in the latter, they are much the most numerous. I cannot give a more forcible proof of their numbers, than by stating, that when we were left at James' island, we could not, for some time, find a spot free from their burrows, on which to pitch our tent.

"These Lizards, like their brothers, the sea-kind, are ugly animals; and from their low, facial angle, have a singularly stupid appearance. In size, perhaps, they are a little inferior to the latter, but several of them weighed between ten and fifteen pounds each. The colour of their belly, front-legs, and head, excepting the crown, which is nearly white, is a dirty yellowish orange. The back is brownish red; which in the younger specimens is darker.

"In their movements, they are lazy and half torpid. When not frightened, they slowly crawl along, with their tails and bellies dragging on the ground. They often stop, and doze for a minute, with closed eyes, and hind legs spread out on the parched soil.

"They inhabit burrows, which they sometimes excavate between fragments of lava, but more generally on level patches of the soft volcanic sandstone. The holes do not appear to be very deep, and they enter the ground at a small angle; so that, when walking over these Lizard warrens, the soil is constantly giving way, much to the annoyance of the tired walker.

"The animal, when excavating its burrow, alternately works the opposite sides of its body. One front leg, for a short time, scratches up the soil, and throws it towards

the hind foot, which is well placed, so as to heave it beyond the mouth of the hole. This side of the body being tired, the other takes up the task; and so on alternately. I watched one for a long time, till half its body was buried; I then walked up, and pulled it by the tail; at this, it was greatly astonished, and soon shuffled up, to see what was the matter, and then stared me in the face, as much as to say, 'What made you pull my tail?'

"They feed by day, and do not wander far from their burrows; and if frightened, they rush to them with a most awkward gait. Except when running down hill, they cannot move very fast; which appears chiefly owing to the lateral position of their legs.

"They are not at all timorous: when attentively watching any one, they curl their tails; and, raising themselves on their front legs, nod their heads vertically with a quick movement, and try to look very fierce; but, in reality, they are not at all so: if one just stamps the ground, down go their tails, and off they shuffle, as quickly as they can. I have frequently observed small insectivorous (fly-eating) Lizards, when watching any thing, nod their heads precisely in the same manner; but I do not at all know for what purpose.\* If this Amblyrhynchus is held, and plagued with a stick, it will bite very severely; but I caught many by the tail, and they never tried to bite me. If two are placed on the ground, and held together, they will fight and bite each other till blood is drawn.

"The individuals, (and they are the greater number,) which inhabit the lower country, can scarcely taste a drop of water throughout the year; but they consume much of the succulent caetus, the branches of which

\* A Lizard common in Egypt, (a species of *Stellio*,) dips its head in the same way; and the Mohammedans pursue, and kill it, because they say it mocks them, by this action, when they are engaged in their devotions. Such is the folly of superstition.

are occasionally broken off by the wind. I have sometimes thrown a piece to two or three together, and it was amusing enough, to see each trying to seize and carry it away in its mouth, like so many hungry dogs with a bone. They eat very deliberately, but do not chew their food. The little birds are aware how harmless these creatures are; I have seen one of the thick-billed finches, picking at one end of a piece of cactus, (which is in request among all the animals of the lower region,) whilst a Lizard was eating at the other; and afterwards, the little bird, with the utmost indifference, hopped on the back of the Reptile.

“I opened the stomachs of several, and found them full of vegetable fibres, and leaves of different trees, especially of a species of acacia. In the upper region, they chiefly live on the acid and astringent berries of the guayavita; under which trees, I have seen these Lizards, and the huge Tortoises, feeding together. To obtain the acacia leaves, they crawl up the low, stunted trees; and, it is not uncommon to see one, or a pair, quietly browsing, whilst seated on a branch several feet above the ground.

“The meat of these animals when cooked, is white; and, by those whose stomachs rise above all prejudices, it is relished as very good food. Humboldt has remarked, that in intertropical South America, all Lizards which inhabit dry regions, are esteemed delicacies for the table. The inhabitants say, that those tenanted the damp regions drink water; but that the others do not travel up for it from the sterile country, like the Tortoises.”

The eggs, which are numerous, large, and oval, are deposited by these Lizards in their burrows: the inhabitants of the islands esteem them as food.

“These two species of *Amblyrhynchus* agree,” adds Mr. Darwin, “in general structure, and in many of their habits. Neither have they that rapid movement, so

characteristic of true *Lacerta* and *Iguana*. They are both herbivorous; although the kind of vegetation, consumed in each case, is so very different.

“ Mr. Bell has given the name to the genus from the shortness of the snout; indeed, the form of the mouth may almost be compared to that of a Tortoise. One is tempted to suppose, this is an adaptation to their herbivorous appetites.

“ It is very interesting thus to find a well characterized genus, having its aquatic and terrestrial species belonging to so confined a portion of the world.

“ The former species is, by far, the most remarkable; because it is the only existing Saurian, which can properly be said to be a maritime animal.

“ I should, perhaps, have mentioned earlier, that, in the whole archipelago, there is only one rill of fresh water that reaches the coast; yet, these Reptiles frequent the sea-beaches, and no other parts in all the islands. Moreover, there is no existing Lizard, as far as I am aware, excepting this maritime *Amblyrhynchus*, that feeds exclusively on aquatic productions. If, however, we refer to past epochs, we shall find such habits common to several gigantic animals of the Saurian race.”

Passing over several genera, interesting to the naturalist, but less so to the general reader, as little is known of the habits and manners of the species which they contain, we pause at the genus *Iguana*.

#### GENUS IGUANA.

The species composing the genus *Iguana* are few in number; three only being definitely characterized. They attain to considerable dimensions, and have a fierce aspect. A serrated, dorsal crest, consisting of elevated, compressed, and pointed scales, runs along the spine, and is continued down the tail. A large pendulous dewlap, capable of being inflated, hangs under the throat. The scales of the body are small, somewhat lozenge-



shaped, slightly keeled, and but little imbricated. Those on the head are in the form of plates, and constitute a sort of tessellated pavement. The tail is of great length, laterally compressed, and covered with small imbricated, keeled scales. A range of tuberculous pores run down the inside of each thigh. The jaws are furnished with compressed, triangular teeth, having notched, cutting edges; two small rows of teeth are attached to the palate also. The head is of moderate size, comparatively, and of a pyramidal figure. The tympanic membrane, covering the orifice of the ear, is very large and circular. The limbs are long; and the toes are of unequal length.

The Iguanas are arboreal in their habits; and feed on vegetable aliment, perhaps, indeed, exclusively. M. Bibron says, that in the stomachs of those dissected by him, he has found nothing but leaves and flowers.

The Iguanas do not confine themselves to the trees; they often visit the ground; and occasionally take to the water, in which they swim with ease and rapidity, putting their fore limbs close to their sides, and lashing the tail from side to side, in a serpentine manner, and with great vigour.

The Iguanas are easily tamed, or rather habituated to captivity, though they retain a degree of fierceness, and will often attempt to bite. A large Iguana, which we approached rather too familiarly, made several snaps at us, though it betrayed no hostility towards its master. During the pairing season, the male is savage, watches constantly over his mate, and becomes furious if any one approaches her; attacking him with fiery eyes, inflated dewlap, and open mouth. The female visits the shore of the sea, or the borders of rivers, in order to deposit her eggs in the sand.

The incessant destruction of the Iguanas, for the sake of their flesh, has rendered them very scarce, if not altogether extinct, in localities where they were once abundant. Their eggs are also in great request; and, consequently, much sought after.

The common mode of catching these animals, is by throwing a noose over their heads, and pulling them down from the branch on which they are resting. This is easily done, for when discovered, they seldom attempt to escape, but gaze at their assailants, inflating their throats prodigiously, and assuming as formidable an air as possible. They are also taken in traps, or nets, and sometimes hunted with dogs. They are very tenacious of life; and are generally destroyed by a sharp instrument being plunged into the brain.

The COMMON IGUANA, or GUANA, (see engraving,) (*Iguana tuberculata*, Laurenti; *Iguana delicatissima*, Daudin,) is found very generally throughout the warmer regions of South America, and the West India islands; in some of the latter of which, however, it is now extirpated, or is very rare.

It often attains to the length of five feet: we have seen several of more than four feet; and it has been known to measure six. Its flesh is white and delicate, but is found to disagree with some constitutions.

Catesby informs us, that many of the Bahama islands abound with these animals, which “nestle in hollow rocks and trees: their eggs have not a hard shell, like those of Alligators, but a skin only, like those of a Turtle, and are esteemed good food. They lay a great number of eggs at a time, in the earth, which are hatched by the sun’s heat. The Guanans furnish a great part of the subsistence of the inhabitants of the Bahama islands; for which purpose they visit many of the remote kayes and islands, in their sloops, to catch them; which they do by dogs, trained up for that purpose, and which are so dexterous, as not often to kill them. If they do so, however, the Guanans serve only for present use; if otherwise, they sew up their mouths, to prevent their biting, and put them into the hold of their sloop, until they have obtained a sufficient number; which they either carry alive for sale to Carolina, or salt, and barrel up,



COMMON IGUANA.



for the use of their families at home. These Guanas feed wholly on vegetables and fruit; especially on a particular kind of fungus, growing at the roots of trees, and on the fruits of the different kinds of ananas. Their flesh is easy of digestion, delicate, and well-tasted; they are sometimes roasted, but the more common way is to boil them; taking out the fat, which is melted, and clarified, and put into a dish, into which they dip the flesh of the Guana, as they eat it.

“Though not amphibious, they are said to keep under water above an hour. They cannot run fast; their holes being a greater security to them than their heels. They are so impatient of cold, that they rarely appear out of their holes but when the sun shines.”

Brown, in his “Natural History of Jamaica,” (an island where this Lizard is now, we believe, quite extinct,) says, that, like most of the tribe, this animal “lives a very considerable time without food, and changes its colour with the weather, or the native moisture of its place of residence. I have kept,” he adds, “a grown Guana about the house, for more than two months. It was very fierce, and ill-natured, at the beginning; but after some days, it grew more tame; and would, at length, pass the greatest part of the day upon the bed or couch, but always went out at night. The flesh of this creature is liked by many people, and frequently served up in fricassees, at their tables; in which state, it is often preferred to the best fowls. The Guana may be easily tamed while young, and is both a harmless and beautiful creature in that state.”

The Iguanas which we have seen in captivity in this country, appeared to be slow in their movements, and very stupid, with no small degree of ferocity of disposition. We have alluded already to one which made an attack upon the writer; and we have known them to snap violently at other persons.

The general colour of this species, is green, more or

less tinged with olive; or yellowish, marbled with a brighter tint. The tail is ringed with dusky black. The sides of the neck are covered with tubercles; and a large circular scale is below the auditory orifice.

A second species, *IGUANA RHINOLOPIA*, Weigm., is distinguished by the muzzle being surmounted with four elevated scales, like compressed horns, placed one behind the other. It is a native of Mexico and St. Domingo.

A third species, *IGUANA NUDICOLLIS*, Cuv., is distinguished by the absence of tubercles on the neck, and of the large scale below the tympanum; and by the presence of a row of large, strong scales along each side of the lower jaw. It is found in Martinique, Guadaloupe, and Brazil. It is figured by Seba.

#### GENUS BASILISCUS.

The genus *Basiliscus*, Daudin, differs from the *Iguana*, in wanting femoral pores, and in the dewlap being more contracted. A triangular fold of thin skin, sustained by a cartilage, rises vertically from the middle longitudinal line of the back of the head, giving a singular aspect to the animal, which appears as if crowned with a raised hood, or pointed cap. The body is covered with small, keeled scales, disposed in transverse bands; those of the under parts are larger. An elevated, serrated ridge of scales runs along the middle of the back and tail, sustained by the elongated, spinous processes of the vertebral column. In the males of one of the two species known, this crest on the lower part of the back, and along the tail, becomes singularly elevated, and presents the appearance of a continuous fin; the processes being greatly lengthened for its support. The head is covered with small, keeled plates. The tympanic membrane is large and oval. The palate is furnished with teeth.



The CROWNED BASILISK,\* (*Basiliscus mitratus*, Daud.) is a native of Guiana, and other parts of South America, and must not be confounded with the fabulous Basilisk of the African deserts, so renowned in the imaginative works of the ancients.

Though of large size, measuring upwards of two feet in length when adult, and of formidable aspect, this creature is very harmless. Grain and vegetables are said to form its chief diet. In its habits, like the Iguanas, it is arboreal; but often takes to the water, swimming with ease and rapidity.

Its colour is yellowish brown, passing into whitish on the under parts. A longitudinal stripe of white, edged with black, extends from each eye to the sides of the back, and then blends with the general tint. It is in the males of this species, that the crest of the tail and back is so greatly developed. In the other species, the BANNED BASILISK, (*B. vittatus*, Weigm.) the crest is far less amply developed, and is simply dentated. It is a native of Mexico.

From the genus *Iguana* have been separated the genera *Metopoceros* and *Cyclura*.

#### GENUS METOPOCEROS.

In the genus *Metopoceros*,† the throat is dilatable, but the skin does not form a dewlap. There are teeth on the palate; those of the jaws are three-pointed. The back and tail are ridged. The thighs have a double row of pores. The tail is long and compressed. The forehead is surmounted by a tuberculous scale, rising in the form of a horn, covering a conical, bony prominence. Of this genus only one species is known, the HORNED IGUANA of St. Domingo, (*M. cornutus*, Wagler; *Iguana cornuta*, Latr., Cuv.) It was first described by Lacépède, who states it to be a native of St. Domingo; but M. Bibron doubts the correctness of this assertion, as no

\* Βασιλίσκος, (*basiliscos*,) a little king, or kinglet.

† Μετωπον, (*metopon*,) the forehead: and κερας, (*keras*,) a horn.

specimen has ever been received among the numerous collections of natural objects, obtained since the time of Lacépède, from that island; and he only derived his information from the person who gave him his specimen. Of the habits of the animal we have no information. In size it equals the common Iguana.

#### GENUS CYCLURA.

The genus *Cyclura*\* contains three species, of which the best known is the SPINE-TAILED IGUANA of Carolina. (*C. carinata*, Wagler; *C. Harlani*, Bibr.; *Iguana cyclura*, Cuv.)

The characters of the genus *Cyclura* are as follow:—The skin of the throat is loose, and transversely wrinkled, but is not formed into a true dewlap. There are teeth on the palate; those of the jaws are three-lobed. The thighs have a single row of femoral pores. The back and tail are crested; the latter is compressed, and covered with scales forming rings, alternating with rings of spines. The habits of the species of this genus resemble those of the true Iguanas; they feed on leaves and flowers, and live in trees.

The Caroline species is a native both of Carolina and Cuba. It attains to the size of the common Iguana.

As we cannot, for want of space, and ought not in a sketch like the present, to follow out the various genera which the present section of the Iguanians presents, a few characteristic examples being sufficient for our purpose, we shall at once proceed to the section termed by Dumeril, Acrodonta. We may, indeed, be blamed for passing by genera of importance, without even noticing their names; but, unless we were to enter fully into details, the mention of mere names would be rather a display on our part, than a contribution of substantial information. Names are not science, they are hooks to hang science upon; and hence a parrot-like enumeration

\* *Κυκλος*, (*kyklos*,) a circle; and *ουρα*, (*oura*,) a tail.

of genera, undescribed, is a ridiculous affectation. A clue once given, the student may easily find his way.

## II. ACRODONTA.

The characters of the section Acrodonta, and the geographical range of the Reptiles it includes, we have already explained. We need not, therefore, revert to those topics. We may, however, add, that in none of this section is the palate armed with teeth; and that in most, there is no external auditory orifice.

The first genus which we shall notice, by way of example, is that termed *Istiurus*.\*

### GENUS ISTIURUS.

The head, in this genus, is pyramidal, and covered with small, equal, keeled plates. The tympanic membrane is large. There is a small dewlap under the throat, with a triangular fold before the chest. The neck, trunk, and tail, are compressed; the former two are surmounted by a ridge of scales, as is also the tail at its basal portion; where, in the male, it assumes a very considerable elevation, and is supported by the spinous processes of the vertebræ. There are pores on the thighs. The toes are long, and are furnished on each side with a margin of horizontal scales; in the hind feet, these scales are so developed, as to form a sort of web, or firm expansion; the toes having great resemblance to those of the grebes, and other aquatic birds, in which they are not absolutely united together. These Lizards, in fact, pass the greater portion of their existence in the water; and hence, the oar-like figure of the feet. The tail is two-thirds the length of the whole animal. Three species are known. One of these, the AMBOINA PORTE-CREST, (*Istiurus Amboinensis*,) a native of Amboina, and probably of other islands of the Moluccas, attains to the length of three, or nearly four feet. It feeds on grains,

\* *Ιστιον*, a sail; *ουρα*, a tail.

fruits, worms, and insects. Cuvier found leaves and insects in its stomach. In its habits it is aquatic; frequenting rivers, and concealing itself among the luxuriant vegetation which borders them. When disturbed, it plunges into the water, and swims and dives with great address; its crested tail admirably serving both as an oar and rudder. Its flesh is esteemed as a delicacy for the table. The general colour of this Lizard is olive green, marbled and veined with black on the upper surface. The head and limbs are of a reddish brown; the former marked with lines of dark brown, the latter mottled with yellow.

A second species (*I. lesueurii*) is a native of New Holland. The third species (*I. physignathus*) is from Cochin China.

To the present section belong the genera Calotes, Lophyrus, Sitana, and others, of which the species, though interesting to the naturalist, are less so to the general reader, from our want of details connected with their habits and manners.

#### GENUS CHLAMYDOSAURUS.

The same remark, indeed, applies to the genus Chlamydosaurus, of which only one species is known; but which is so singular, from the presence of a large frill of skin around the neck, that we cannot omit an express description and figure of it. (See engraving.)

This remarkable Lizard, (*C. Kingii*, Gray,) is a native of New Holland; and is, at once, to be recognised by an expanse of skin, in the form of two large discs, which form a frill to the sides of the neck and throat; the edge of this frill is serrated; and the whole is covered by small, keeled scales. There are pores on the thighs. The head is short, and somewhat pyramidal; the tail long. In size, this animal approaches the Iguanas; measuring, when adult, about three feet in total length. Its general colour is yellow, with mark-



CHLAMYDOSAURUS, OR FRILLED LIZARD.





ings of a lighter tint, bordered with brown on the back. Of the use of its expansive frill, we can offer no opinion; nor are the habits of the animal recorded.

#### GENUS DRACO.

We now pass to the genus *Draco*, which contains about eight species; natives of India, Java, Sumatra, Manilla, and Timor, etc.

These little Lizards are distinguished, at a glance, by the horizontal extension of the skin of the sides into parachutes, resembling the wings of a butterfly; and have been, from this circumstance, called Dragons by naturalists. We must not startle at the name; the dragon of romance is not the dragon of nature, and lives only in fantastic fables.

The “gorgons, hydras, and chimeras dire—” monsters, with which credulous ignorance once peopled the foreign regions of the earth—have vanished before the light of science; and we now smile at the names and pictures of beings which could not have possibly existed, inasmuch as their component parts could not be associated together, without a violation of the laws of organic structure. Fear may give wings to the mighty boa, but wings would not assist its progress, nor could they be possessed by it; and for this reason, the plan upon which the skeleton is built prevents it. In snakes there is no breast bone, no clavicles, (collar bones,) no scapulæ, (flat shoulder bones,) and these are essential to the presence of true, effective wings. Look, for example, at the skeleton of a bird; how vast is the sternum, (breast-bone,) with its deep keel, affording an ample space to be occupied by the peculiar muscles, which act upon the organs of flight. In addition to the clavicles which support the shoulders, and keep them duly forward, there is the furculum, (merrythought,) strictly analogous to the clavicles of man, keeping the shoulders wide apart, and bearing the strain of the muscles, which tends to bring them together. Again, look at the short, firm,

and almost immoveable back-bone, whence arise the strong ribs locked upon each other, and uniting firmly with the edge of the sternum. But the structure of the snake is the opposite to all this : short, slender ribs, and a back-bone, composed of a multitude of distinct portions, united by a ball and socket mode of articulation, characterize its flexible framework.

But though flying snakes are fabulous beings, and winged boas, careering on expanded pinions, creatures of imagination, the addition of membranous wings to the structure of Lizards, is not incompatible with the plan of their skeleton.

Among the strange and anomalous beings, whose existence, at some distant epoch of our earth, is proved by the researches of geology, which have brought to light their fossil remains, we find a flying Lizard, to which Cuvier has given the name of *Pterodactylus*, and which, as the construction of its skeleton abundantly proves, was capable of skimming from one spot to another; or, perhaps, even of flitting at pleasure through the air, on wide and ample wings. That these wings were membranous, may be safely inferred, from the circumstance of their being supported upon long, slender bones, very like those we find in the wing of the bat. In short, these bones acted as stretchers, when the wings were expanded, and were neither more nor less than the bones of the second finger of each fore paw, lengthened out so enormously, as to extend to more than double the length of the body. The neck was very long, and bird-like; the head large; the jaws armed with pointed teeth; and the tail very short. Six or seven species appear to be distinguishable; of these, one is almost the size of a thrush, one of a common bat, and one considerably larger than the first. We may, without overstepping the bounds of probability, nay, perhaps of certainty, picture to ourselves these strange creatures, flitting on 'leathern wings,' amidst deep and mighty forests, in chase of their insect prey.

To these extinct Reptiles, the little Dragons bear but a distant resemblance: the membranous, wing-like expansions which they possess, are not at all connected with the limbs, which are perfectly free, but are supported, as may be seen in the annexed sketch, by the



SKELETON OF THE DRAGON.

first five false ribs, on each side; these ribs, instead of turning down, and thus encircling the body, are greatly elongated, so as to form the framework of the membrane stretched over them. This membrane, then, capable of being folded up, but incapable of being agitated, so as to strike the air, constitutes rather a parachute than a pair of wings: when expanded, it enables the animal to take long sweeping leaps, from branch to branch, or

tree to tree, where it searches among the leaves for the insects on which it subsists: but it cannot fly like the bird, or the bat, or the extinct Pterodactylus. Among the Mammalia, we find a certain degree of analogy to this Lizard in the flying squirrels, which have a membrane extending along the sides, between the anterior and posterior extremities, so as to endow them with the power of taking long, skimming leaps, among their native branches.

The characters of the genus *Draco*, in addition to the membranous paraehutes, are as follow. The body is covered with minute scales; the tongue is fleshy, and capable of very little power of protrusion. Beneath the throat hangs a pendulous fold of skin, forming a dewlap of considerable extent. The tail is long and slender. The teeth in each jaw consist of four little incisors in front, and on each side a canine tooth, and twelve little grinders, each crowned with three points.

One of the most common of the species is the *DRACO DAUDINII* of Bibron, (*Draco volans*, Gmelin.) It is a native of Java; and lives in the woods, on the branches of which it rests, concealed amidst the foliage. It is quick and alert in its actions.

We might here enter into the characters of several other genera, as *Leiolepis*, *Grammatophora*, *Agama*, *Stellio*, *Uromastix*, etc.; but as we aim only at a sketch, and as these genera are interesting rather to the naturalist than to the general reader, we shall omit an express account of them, referring the student to MM. Dumeril and Bibron's work on Reptiles, for full information.

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## VI. FAMILY, TRUE LIZARDS.

To the British naturalist, this family offers many points of interest. It is that to which every Lizard indigenous in our islands is referable; and of which, consequently, the habits and the manners are the best understood.

Our own species, therefore, will chiefly claim our notice, though not to the exclusion of some of the more remarkable of the genera peculiar to distant regions.

With respect to the general characters of this family, they may be summed up as follow :—

The body is rounded and elongated ; and the tail, which mostly exceeds the body, is conical, terminating in a slender point, and is covered with scales, disposed in regular rings around it.

The limbs are well developed ; the toes are four or five in number on each foot, and are armed with hooked claws.

The head is pyramidal, flattened above, and covered with plates ; the tympanic membrane is distinct ; there is usually a *membrana nictitans*, for the protection of the eye, besides the ordinary eyelids. The mouth is very wide, and its edges are covered with large labial plates.

The skin is scaly, the scales varying in form ; but there is no dorsal ridge, though sometimes a ridge along the tail. The throat is not dilated into a dewlap ; but a distinct row of large, broad scales, with one or more transverse folds, dividing between them and the general scaling of the under parts, forms a throat collar, which is very distinct. The abdomen is protected by scales, always much larger than those of the back, and either oblong or rounded. The thighs are mostly furnished with a line of pores.

The tongue is free, fleshy, slender, and bifid ; it is capable often of great extension ; and is frequently lodged in a basal sheath.

The teeth are variable in form and structure, but are inserted into the internal edge of a common furrow, running along the ridge of the maxillary bones. Sometimes there are teeth in the palate ; sometimes the contrary.

And here it may be observed, that M. Dumeril divides the Lizards proper, into two sections, according to the characters which the teeth present.

The first section, which he terms Pleodonta, (*πλεος*, *pleos*, full, not hollow, and *ὀδους*, *οδοντος*, *odous*, *odontos*, a tooth,) is distinguished by the teeth being completely solid, without any interior cavity; and by their being firmly fixed, by their edges and outer surface, to the bones of the jaws, in a groove, along the inner aspect of their ridge.

The second section, termed Cœlodonta, (*κοιλος*, *koilos*, hollow,) is characterized by the teeth being hollowed by a sort of canal, and but slightly adherent to the bones of the jaws, against which they are placed in a groove within the ridge of the jaw; and to the bottom of which their base, or root, is not firmly attached.

The Pleodonta are all peculiar to America; the Cœlodonta to the old world. No true Lizard has yet been discovered, either in Australia, or the Polynesian islands.

Of all the Sauria, the animals of the present family are the most active and vivacious; their movements are distinguished by extreme promptness and rapidity, and they disappear from our sight, with the celerity of lightning. It is, however, only by sudden darts, and for short distances, that these movements are executed; and if the animals do not soon gain their hiding-place, or burrow, they become fatigued, and easily fall a prey to their enemies. Hence, they never undertake long excursions from their native spot, or from the retreat which they have selected.

If we notice a Lizard running over the ground, or diving amidst tangled herbage, we cannot but perceive that the movements of its body are serpentine. These animals, in fact, assist themselves in locomotion, not exclusively by the limbs, but, also, and that materially, by the body, and especially by the tail. The latter is liable to accidents, and is so brittle, as to break off easily, but it is soon renewed: the renewed part, however, is clearly distinguishable, by a difference of colouring, from the rest; and the vertebræ, instead of being hard and bony, are in a state of cartilage. We have said, that the head



of these Reptiles is covered with plates; these are of different sizes and figures, and have received different names, according to their situation. The annexed sketch will serve to explain their general character; but the reader must bear in mind, that they vary greatly in the various genera, and even species. *a*, the rostral plate; *b*, the nasal plates; *c*, the internasal plate; *d*, the fronto-nasal plates; *e*, the palpebral plates; *f*, the frontal plate; *g*, the parietal plates; *h*, the fronto-parietal plates; *i*, the interparietal plate; *k*, the occipital plates.



Besides these, may be enumerated the labial plates, which cover the edges of the mouth, or rather the margin of the upper and under jaws; the mental, (*mentum*, the chin,) or chin plate; and the sub-maxillary plates, which cover the under surface of the lower jaw, from the chin to the throat.

## I. PLEODONTA.

We have said that the Plcodonta are exclusively American.

### GENUS ADA.

To this section belongs a group, of which the genus *Ada*, of Mr. Gray, (divided by M. Bibron into the genera *Crocodylurus*\* and *Thorictes*,) is an example. The species, in size and aquatic habits, and in the compressed form of the tail, approach the Crocodiles. The tail, in fact, is not only compressed, and oar-like, but is surmounted by a double serrated, scaly ridge, the one distinct from the other, extending down its whole length. These Reptiles, although the toes are not palmed, like those of the Crocodile, pass the greater portion of their life in the water. It is in the large rivers,

\* With a tail like that of a Crocodile.

lakes, or wide morasses of South America, that these Lizards are to be seen; but we know little of their habits.

The COMMON ADA, of Mr. Gray, (*Thoricetes draconæna*, Bibron; *La grande dragonne*, Cuvier,) attains to the length of from four to six feet. It is a native of Guiana; and, if the large Lizard which M. Humboldt and Bonpland often saw, in the lake of Valencia, be the same, it also inhabits Mexico.

In Guiana, it frequents the morasses and lakes; and is said to be very frequently seen on the land, as often indeed, as in the water: it is not easy to capture alive, because, when pursued, it takes refuge in its burrows, or holes, which are deep. M. de Laborde kept one of these animals for some time; it passed whole hours in the water, and when alarmed, fled to it, and plunged in, in order to conceal itself. It was fond of lying on the water's edge, basking in the rays of the sun. It bit very severely, inflicting painful wounds; and would frequently shoot out its quivering tongue, like a serpent. Its flesh is accounted excellent by the natives, who compare it to that of a fowl; its eggs are, also, in great request.

Passing from the crocodile-like Lizards, we come to an allied group, in which the tail is either conical, or slightly flattened both above and below, and at the sides; the angles, however, being rounded. To this group belongs the genus *Teguixin*, Gray, (*Salvator*, Bibron;) and to which, when noticing the Varans, we have already alluded.

#### GENUS TEGUIXIN.

In the genus *Teguixin*, the tongue is bifid, very long, and extensible; there are no teeth on the palate; the nostrils open on the sides of the extremity of the muzzle; the tympanic membrane covers the orifice of the ear; the skin of the throat forms two or three transverse folds; the back is covered with little angular scales,

having a smooth surface, not imbricated, and disposed in transverse lines. The abdominal plates are smooth, and oblong. There are femoral pores.

The Teguxins, or 'Sauve-gardes,' belong to the hotter regions of America; and attain to considerable dimensions, measuring from four, to five or six feet in length. The places which they ordinarily frequent, are plains, and the borders of woods; but they never climb trees. They are found, also, in sandy and arid tracks, where they scrape burrows in the ground, and which serve them for winter dormitories.

Azara, who describes a species, the COMMON TEGUIXIN, (*Teguxin monitor*, Gray,) under the name of *Teyou-gouazou*, states, that it lives upon fruits, insects, toads, nestling birds, and eggs, and even small vipers; it is also reported to eat honey, and that, in order to drive away the bees, it strikes the hive with its tail, then precipitately retreats, and then repeats its blow, till it has frightened them away. M. Bibron says, "We are not able to state, whether, as Azara informs us, these Lizards are frugivorous or not; but we are certain that they prey upon insects, for we have found them in the stomachs of all the individuals which we have dissected. On one occasion, we observed the remains of beetles and caterpillars, mingled with portions of the skin and bones of the Common Ameiva," an allied species of Lizard.

According to Azara, the Teguxin is extremely rapid in its actions; when it is pursued, it makes for the nearest lake, or river, and entering, walks along the bottom, but does not swim,\* and remains there, until it is satisfied that its aggressor has departed. Azara's statement, that this Lizard does not swim, is doubtful; we can readily admit, that it does not use its feet in swimming; but we have reason to believe, that with its long and

\* "Il y entre, et y marche sans nager."

powerful tail, it lashes the water from side to side, and thus propels itself along.

The Teguxin bites severely, and will not let go its hold; it seizes its prey, and obstinately retains it.

The writer already quoted states, that rings of skin, stripped from its tail, are worn as preventives against paralysis, from a belief in their efficacy; and that its fat is useful in cases of tumours. Its flesh is accounted excellent.

#### GENUS AMEIVA.

The genus *Ameiva* differs from the preceding in minor particulars only. The tail is not at all compressed, and, together with the abdomen, is covered with transverse ranges of squared scales: those of the abdomen are broader than long. These American Lizards nearly resemble our European species in outward form, and are their representatives in the new world; but they have not a collar of broad scales, those of the throat being all small; their head is more sharply pointed at the muzzle than our Lizards; and they have not, like the latter, an osseous plate over the orbit. The skin of the throat forms one or two folds. The nostrils are oval and oblique. The anterior maxillary teeth are pointed; the posterior are tricuspid.

The *Ameivas* are seldom found in the vicinity of water; some species indeed, frequent sandy, arid districts exclusively. They live on worms, slugs, snails, and various kinds of insects; and vegetables are not excluded. "We have often found," says M. Bibron, "the remains of the leaves of various grasses, in the stomachs of individuals examined by us, and not unfrequently a considerable quantity of grains of sand, and small pebbles."

The COMMON AMEIVA, (*Ameiva vulgaris*, Licht.; *Tegus ameiva*, Spix,) (see engraving,) is about a foot and a half in length; it is spread through Brazil and Guiana; and is most agreeably coloured, the general hue being a



COMMON AMEIVA.





fine olive green, or a bluish green, marbled and spotted, in the male with black.

Several other species are described.

Passing over the other genera of this section, which are more or less closely related to those already noticed, and, indeed, have been only very recently separated as distinct, we come to the next section.

## II. CŒLODONTA.

Of this section, the genus *Lacerta* affords us the most marked and interesting examples.

### GENUS LACERTA.

The Lizards (*Lacerta*) are easily distinguishable by the throat-collar of broad scales; the tongue is long and forked; the scales of the tail are disposed in rings; a minute plate of bone above the orbits protects the eyes; a long row of pores runs down each thigh; the palate is toothed.

Many of the species of this genus are remarkable for their beauty. Of these, one of the most conspicuous is the EYED LIZARD, (*Lacerta ocellata*,) (see engraving,) of Southern Europe, which attains to about sixteen inches in length; its ground colour is a bright glossy green, ornamented with round spots of gold, and blue, and with rings, and irregular markings of black. This Lizard is found in the South of France, in Italy, Spain, and the northern coast of Africa. While young, it makes burrows in the banks of the fields, especially where the ground is sandy; but, when full-grown, it excavates its retreats in layers of hard sand, often between two beds of calcareous rock, having an abrupt slope, and exposed, more or less, directly to the south, or south-east. It also burrows among the roots of aged trees, in vineyards, or under hedgerows. Worms and insects constitute its food. The actions of this richly tinted species are prompt and rapid; and, as it glances by in the sun, its colours glisten

with metallic brilliancy. It is bold and resolute; if attacked by a dog, it defends itself with great determination, and fastening on the muzzle of its enemy, will suffer itself to be killed before it will let go its hold. The female lays seven or eight oblong eggs.

Another elegant species, but much inferior to the preceding in size, is the GREEN LIZARD, (*Lacerta viridis*,) often brought in cages, by Italians, to this country for show, or sale. In its colours this Lizard is subject to considerable variation; its general hue, however, is a beautiful metallic green, which, on the under parts, is paler, or fades into a yellow tint. The back and head are often minutely freckled with black, occasionally with yellow; sometimes the head is blue.

The Green Lizard is a native of France, Italy, Spain, Greece, and the neighbourhood of Algiers. It is found in Switzerland, and in the island of Guernsey; but not in England or Ireland. Tangled brushwood, brakes, and thickets, are its favourite places of resort; it climbs the stems of the bushes with great facility, and feeds on insects. Its movements are quick and graceful; and it is confident, and soon rendered tame. Its beauty and gracefulness are such recommendations that it is often kept in cages, which should have an inner compartment filled with dried moss, or bran; amidst which it buries itself, in order to pass the winter. It seldom attempts to bite; and, indeed, as we have experienced, its bite is a pinch scarcely to be felt. Towards those whom it knows, it shows signs of attachment; it will take flies from them, or other food, and permit itself to be handled, without betraying the slightest fear. It is very impatient of cold, and delights to bask in the rays of the sun, in which it glitters with metallic effulgence. It might be turned loose in green-houses, or vineries, where it would not only be ornamental, but very useful in destroying insects.

A beautiful species of Lizard, considerably larger than



EYED LIZARD.



the Green Lizard, is a native of England, and the European continent generally. This is the SAND LIZARD, (*Lacerta agilis*, Linn; *L. Stirpium*, Daud.) This species, till recently, has been confounded with others, and especially with the Viviparous Lizard, also common in England; but its history has been cleared up by Mr. Bell, with great care, in his work on "British Reptiles."

The Sand Lizard is subject to considerable variations of colouring. In most, the general tint of the upper parts is sandy brown, with obscure longitudinal marks of a darker brown, and with a series of black rounded spots down the sides, each spot marked with a white or yellowish dot in the centre. The sides are often tinged with green. In others, the upper parts are green, or brownish green; in others again, of a dull brick-red colour.

The Sand Lizard, according to M. Bibron, inhabits the plains and hills, but never the mountains of the continent. It gives preference to the margin of woods, to copses, large gardens, and vineyards. Its retreat is a burrow, varying in depth, worked out under a tangled maze of herbage, or between the roots of a tree; in this burrow, it remains concealed during the winter, having closed the entrance with earth and dried leaves. It does not re-appear till the warm weather has returned; it then emerges from its dormitory, and gives chase to insects, on which it feeds. The female lays ten or twelve eggs.

We have often seen this Lizard in sandy places, covered with brushwood, and in warm copses: it is quick and active; and its movements, as it runs along, are serpentine. When pursued it makes for its burrow, or dives beneath the matted and thick herbage, escaping from sight with singular rapidity. If seized, it will turn and bite, but its bite is very trifling. Unlike the Green Lizard, it is impatient of confinement, and soon pines to death, never becoming familiar. We have seen several

specimens upwards of seven inches long; but the Rev. R. Sheppard (Linn. Trans., 1802) adduces an instance of one, which exceeded a foot; and Mr. Bell has, "occasionally, seen them approaching that length, measured from the nose to the extremity of the tail." This highly talented naturalist has had abundant opportunities of observing this Lizard, which he informs us is common in the neighbourhood of Poole. "Its general abode," he observes, "is on sandy heaths, where it is frequently seen crossing the small bye-paths, with considerable swiftness, although it is certainly less rapid in its movements than the smaller and more common species, the Viviparous Lizard. The transient glance which is thus obtained of it, together with its viperine appearance and colours, and the size and length of its body and tail, may easily have deceived Mr. Sheppard, who says, that he has often mistaken it for the viper, when hastily passing by it. But it is, also, occasionally seen on the sunny sides of green banks, basking in the sun's rays, and retreating quickly on the approach of any intruder. Mr. Sheppard mentions, that he had once or twice observed it near marshes; and it is, occasionally, seen in the small village of Hamworthy, near Poole, in moist situations. It has been stated, by a gentleman of my acquaintance, that the brown varieties are confined to the sandy heaths, the colours of which are closely imitated by the surface of the body; and that the green variety frequents the more verdant localities just mentioned. Be this as it may, and it is a statement which at present I can neither confirm nor refute, it is certain that these varieties, mentioned by Linnæus, and seen by Müller, do exist in the place I have named, and within a comparatively short distance."

The female buries her eggs in the sand, and covering them carefully, leaves them to be hatched by the heat of the sun. This Lizard and the Viviparous Lizard are the only British species, if we exclude the island of



Guernsey, where the Green Lizard is found ; but the latter is far the most abundant.

The VIVIPAROUS LIZARD, (*Zootoca vivipara*,) forms the type of the sub-genus *Zootoca*, characterized by the palate being toothless. It is a pretty, active little creature, frequenting dry, sunny banks, thickets, and copses. We have found it in the greatest abundance at Southend, Essex, in the wooded pleasure grounds which decline to the Thames ; in Cheshire, it is very common, and, indeed, in most of our counties. It is found in Ireland, as is, also, the Sand Lizard.

Mr. Bell remarks, that “ on the continent, its range does not appear to be extensive ; it is not found in Italy, nor, I believe, in France ; and is very probably confined, in a great measure, to our own latitude.” We are, however, assured by M. Bibron, that it exists both in France and Italy ; and that it inhabits Germany, Switzerland, and Russia, as well as the British islands. “ The Viviparous Lizard,” he adds, “ rarely lives anywhere else than on the mountains. M. Tschudi informs us, that in Switzerland, it frequents, in preference, the forests of dry pines, making its runs under the fallen leaves ; and to these it retreats on the appearance of danger. Sometimes, however, it is met with in damp and humid forests. In this country (France) it is not so common as the Sand Lizard, while in England it is the contrary.”

This Lizard seldom exceeds five or six inches in length, and is very gentle and harmless. Its movements are singularly rapid and sudden ; and it darts on its insect prey with the velocity of an arrow. Its sight is very acute ; the instant it perceives an enemy, it takes refuge in its burrow. Its hearing appears, also, to be good. Some years since, while in a small wood, in Lancashire, seated on a felled tree, we saw several of these animals sporting within a few yards of us, and chasing their prey : we could not but admire their light and graceful actions, and for a considerable time, forbore to make either

the slightest noise, or movement; suddenly, however, we snapped a dried branch asunder, and in an instant they had all disappeared: in a short time, allured by the bright sunbeams, they emerged from their retreats, and on repeating the experiment, they again hastened to their burrows, as before. The ground was covered with half-decayed leaves, and vegetables springing up through the moss, and it was in vain to endeavour to obtain one; we turned over heaps of leaves and grass, but they made their way more quickly than we could follow them. We thought at the time, and have often thought since, of the utility of these little creatures in gardens and greenhouses, insects and larvæ being their subsistence. This species has been confounded with the Sand Lizard (*L. agilis*) by most writers; from which, it need not be stated, it is very distinct. It is not only smaller, but more slender in its contour, with a narrower head, and sharper muzzle.

In one remarkable point the present little species differs from the preceding, namely, in the production of living young; the eggs being hatched before exclusion, and not deposited in the sand: hence the term applied to it, 'viviparous.' "As in all the ovo-viviparous Reptiles," observes Mr. Bell, "the covering of the egg is very thin, and merely membranous; in the viper, which produces its young alive, the covering, as in the present animal, is extremely thin, and very easily torn." "Although I have alluded," he adds, "to the sun's influence, as being the means of hastening the evolution of the embryo, in the eggs of oviparous Reptiles, it is not to be concluded, that the same source of warmth is unnecessary in the present and similar instances. The only difference is, that in the ovo-viviparous species, the solar heat is communicated to the embryo, through the medium of the mother; and hence, we often see the pregnant female, about the month of June, constantly basking in the sun, and lying in such a position, as to expose the body most fully to his influence. Every one

who has watched the habits of our native Reptiles, must have seen the same circumstance in the female of the common viper; and may have observed how much more reluctantly and tardily she leaves the genial spot, than the male."

The ordinary number of young, which this Lizard produces, is four, or five; these are often seen in company with her, and are, probably, for some time under her immediate guidance; they are, however, capable of obtaining their own food, and are lively and alert.

This species varies considerably in markings and general colour. Mostly, however, the upper parts are of a greenish, or olive brown, with a dark brown, interrupted line down the middle of the back, and a similar one on each side; between these and the middle line, or series of dashes, are rows of black dots. The under parts, in the male, are of a fine orange, spotted with black; in the female, pale grey, with a tinge of green, and without spots.

A species of Lizard, the GREY WALL LIZARD, (*L. muralis*,) differing from the last two, is very common over the greater portion of continental Europe and western Asia, but is not found in the British islands.

"Every one," says M. Latreille, "knows this Lizard; and there are few who have not, in childhood, made it an object of amusement: it is almost domestic; and its presence is the more desirable, as it thins the hosts of annoying insects. The ancients called it "the friend of man." It is a harmless little creature, and lives in the chinks of walls and old buildings, where it deposits its eggs. When, on fine spring days, a bright sunlight illumines a sloping, verdant bank, or a wall which reflects the heat, this Lizard may be seen stretching itself on the grass newly springing, or on the stones, as if in the enjoyment of pleasure; it revels in the grateful warmth, and testifies its satisfaction by gentle movements of its slender tail. It darts like an arrow upon

its prey, or into some more commodious spot; but so far from flying on the approach of man, it appears to regard him with complacency. At the least noise, however, which alarms it, at the falling of even a leaf, it rolls itself up, tumbles down, and remains for a little time, as if stunned; or, it darts off, is agitated, returns, again conceals itself, re-appears, and in an instant describes a maze of tortuous circuits, which the eye can scarcely follow, folds itself up repeatedly, and at last retreats to some hiding place, where it remains till its fear has subsided." Insects of various kinds constitute its food.

Its eggs are nearly round. It is subject to several variations of colouring; but the general tint is olive grey, with variously arranged markings.

Several other genera, distinguished by slight characters from *Lacerta*, belong to the present group; but little, respecting the habits of the species they respectively contain, is known.

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## VII. FAMILY, CHALCIDES.

WE have already noticed the gradual transition which takes place between distant orders, uniting them together in so gentle and easy a manner, that it is difficult to demonstrate a line of clear and definite separation between them. This and the next family conduct us, through a different series of forms, each to the snakes, or *Ophidia*; and Mr. Gray, on this account, has regarded these two families as constituting an intermediate order, between the Saurian Reptiles on the one hand, and the *Ophidia* on the other; and has termed them *Saurophidia*, or *Lizard-snakes*. To the present family, for example, belong, according to M. Dumeril, the genera *Amphisbæna*, *Leptosternon*, *Trogonophis*, and *Ophiosaurus*, classed by Cuvier with the snakes; and which, indeed, they resemble in wanting limbs, approaching them, also,

in other structural points. But it must be observed, that we are led to these genera through the genus *Chirotes*, in which there is only an anterior pair of small limbs; and the genus *Pseudopus*, in which there are no anterior limbs, the posterior being merely two scaly and small appendages, and the body having a snake-like elongation. The latter are immediately allied to other genera, having both anterior and posterior limbs.

The animals of the present family have the body cylindrical, extremely elongated, and serpent-like; the limbs are never greatly developed, and are sometimes wanting; the trunk blends with the head and tail, without a distinct line of division, and is covered with scales, disposed in circles, or is marked with circular depressions, or rings; in general, a fold of skin, or a furrow, runs down each side; the head is tessellated with plates; the teeth are not implanted in the bones of the jaws, but affixed to their internal edge; the tongue is free, but not very extensible; it is broad, and covered with papillæ, and is notched at its front.

M. Dumeril divides the family of Chalcidians, into two sections: one (*Ptychopleura*) distinguished by a lateral fold of skin; the other (*Glyptoderma*) by the square, or card-like divisions, in regular order, observable over the whole extent of the skin, which is not protected by scales, but which is ringed, or marked with circles, and by the eyes being destitute of eyelids. To these nice distinctions we shall not here attend: it is sufficient merely to point them out.

With respect to the habits of these Reptiles, little seems to be ascertained; generally speaking, they are natives of hot climates, and desert situations; and hence, travellers who have collected them, and transmitted them to Europe, have had but few favourable opportunities of studying them in their native localities.

To a certain extent, however, their forms denote their modes of life. Their rounded and almost cylindrical contour, the head being not separated by a true neck

from the trunk, is not favourable for the execution of rapid, or continued movements; and the shortness of the jaws, and smallness of the mouth, indicate that the prey upon which these Reptiles feed, is weak and minute; having no teeth capable of tearing, or retaining in their gripe, victims of even trifling magnitude, they can only pursue, or attack such as can make no resistance, namely, insects, worms, and slugs. They are endowed neither with courage nor energy; and none are in the habit of taking to the water, or of seeking their prey there.

The species belonging to the genera in which the limbs are present, as usual, doubtless, climb and run with more celerity than those destitute either of one pair, or of all these organs; and appear to resemble our Lizards in habits, but without their restlessness and agility. The species without limbs, or with a rudimentary pair only, slowly crawl by winding flexures of the body; and as most have a lateral fold, which permits, on spreading, the application of the ribs to the ground, these also aid in progression. When the skin, as in the *Ptychopleura*, is covered with distinct horny scales, disposed in regular rings, the animals live on the surface of the ground, and in these the eyes are furnished with eyelids; but when the skin is covered only with square elevations, as in the *Glyptoderma*, there are no eyelids; and these animals generally live, like worms, in the soft earth, or in places where the light scarcely penetrates. It is known, that most of the species inhabit (as the *Amphisbæna*) the nests, or great mounds of sand, formed by the termite ants, which insects, destitute of wings, serve these creeping animals for food. The two extremities of the long body are of equal size, whence they have been, erroneously, termed double-headed snakes; and it is asserted, that they can crawl, like a worm, either with the head, or tail first, through the galleries which they bore in the humid or sandy earth; and hence, the name of *Amphisbæna*, which signifies a mover in both ways, head or tail first. In these, the eyes are minute, and covered by the skin,



and are only to be discovered by a black, or dusky spot, which the iris presents, as seen through the transparent membrane.

With regard to geographical distribution, Africa and America may be said to divide the Chalcidians between them, for, with the exception of one species, the sole example of its genus, (*Trilobonotus*, Dumeril and Bibron,) which inhabits New Guinea, they produce all the rest. It is in America, however, that we find the greatest number; for while Africa possesses fifteen species, belonging to five genera, America produces twenty five, which have been regarded as examples of ten distinct genera.

It is, however, to be observed, that a few species have a general distribution, as, for example, the Scheltopusik, (*Pseudopus Pallasii*, Cuv.,) which inhabits not only the northern coasts of Africa, but also Dalmatia, the Morea, and the southern districts of Siberia, being at once African, European, and Asiatic. A species of *Amphisbæna*, (the *Amphisbæna cinerea*,) also inhabits northern Africa, together with Spain and Portugal; the other species being respectively American and African: and while out of four species of Chalcides, three are American, one (*C. Schlegeli*, Bibr.) is a native of the island of Java.

Without attempting an elaborate description of all the genera, which is not our present aim, we shall direct our readers to a few of the more remarkable; following them as they lead from the Lizards to the Snakes, irrespective of their subdivision into the sections alluded to.

#### GENUS ZONURUS.

This genus, subdivided into three sub-genera, *Cordylus*, *Hemicordylus*, and *Pseudocordylus*, is peculiar to Africa. In this group, the limbs are four, and robust; and there are one, two, or three rows of femoral pores; the feet are furnished each with five toes; the tail is short; and the head triangular and flattened. There are no teeth on the palate. The CORDYLE LIZARD

of Shaw, the ROUGH-SCALED CAPE LIZARD of Petiver, (*Z. griseus*, Bibr.,) is an example. It is a native of South Africa, where it is very common.

#### GENUS TRILOBONOTUS.

The genus *Trilobonotus*, of which one species only is known, is destitute of femoral pores; and may at once be distinguished by the scales of the back and tail, which, in the form of strong spines, present a formidable array. The plates covering the head, are soldered to the bones. Of this species, the NEW GUINEA TRILOBONOTE, (*T. Novæ Guineæ*,) we present an engraving. One specimen, in the museum of Leyden, is the only example in Europe. Of its habits nothing is known.

#### GENUS GERRHOSAURUS.

The genus *Gerrhosaurus* is distinguished by teeth on the palate; by the plates on the head being large, and very distinct from those on the neck; by the limbs being short, the hinder having femoral pores; by the scales of the body forming rings; and by a fold along each side. Five species are known, all natives of Africa and Madagascar.

We figure the DOUBLE-BANDED GERRHOSAURUS, (*G. bifasciatus*, Bibr., see engraving,) a native of Madagascar. Of its habits we know no details.

#### GENUS GERRHONOTUS.

Closely allied to the last genus, is the genus *Gerrhonotus*; the thighs, however, are destitute of pores. Of the eight species known, seven inhabit Mexico, one California. They produce their young alive; and in their habits closely resemble our Lizards.

#### GENUS CHALCIDES.

Passing from these more lizard-like groups, to the genus *Chalcides*, we arrive at a genus in which two pairs of limbs are, indeed, present, but both extremely short, and of which the posterior are sometimes represented by



NEW GUINEA TRILOBONOTE.







DOUBLE-BANDED GERRHOSAURUS.



simple appendages. There are, in general, toes on each foot, to the number of three or four, but these are very minute, and in some species can scarcely be considered as more than little scaly tubercles. There are no femoral pores. The form is elongated and snake-like; but a slight lateral fold is perceptible, in which is a row of oblong and minute tubercles. The tongue is arrow-like in figure, with a sharp and bifid point; and its surface is covered with large, flat, imbricated papillæ, resembling, in form and arrangement, the scales of a fish. Four species are described, one (the *C. Schlegeli*) a native of Java; the rest are found in Guiana, Columbia, and Chili.

#### GENUS PSEUDOPUS.

From these Reptiles, which in their form and movements resemble snakes, with four minute, and scarcely distinguishable limbs, of little use as organs of locomotion, and which do not support the body, we pass to the genus *Pseudopus*, in which there are no anterior limbs at all, and the posterior limbs are mere scaly and small appendages. The form of the body is completely snake-like, and its movements are serpentine. There are teeth on the palate. The tongue is thin, and like an arrow head, bifid at the point, and covered with papillæ of two kinds; a deep longitudinal furrow runs down each side of the trunk.

The only example of this genus, is the SCHELTOPUSIK, (*Pseudopus Pallasii*, Cuv.,) so called by the natives of the desert of Naryn, near the Volga. It is a native, as already stated, of Africa, bordering the Mediterranean, of the Morea, Dalmatia, and southern Siberia; and was first described by Pallas, under the title of *Lacerta apoda*.

Resembling a snake in form and habits, this Reptile measures about eighteen inches in length, and is of a reddish yellow, or chesnut, clouded with black.

It appears to frequent wooded valleys, where the herbage is abundant; and it gives chase to small Lizards, which, together with insects, constitute its food.

conceals itself amidst the tangled brushwood, and retreats on the slightest alarm. By the parties engaged in the "Voyage Scientifique en Morée," this Reptile was found in the Peloponesus. The first which was seen was basking in the vernal sun, after emerging from its winter retreat, and was instantly demolished by its discoverers, with the butt end of their guns; they were surprised to find it destitute of fangs, and consequently not poisonous.

Subsequently, many other specimens were captured, and kept alive in rooms, their quiet and inoffensive disposition rendering them easily reconciled to such a degree of captivity. They were fed upon hard-boiled eggs, by no means a natural diet, and for which, we would think, more appropriate aliment might easily have been substituted. On one occasion, indeed, one of these Reptiles got access to a nest of young birds, which it soon demolished, and, no doubt, fully enjoyed.

#### GENUS CHIROTES.

The genus *Chirotes*, to which we next pass, is destitute of every trace of posterior limbs; but there is a pair of short, anterior limbs, placed near the head, and terminating in four toes, armed with claws, and a tubercle representing the fifth. These limbs are connected with scapulæ, clavicles, and a short sternum, or breast-bone. The head is small and blunt, and covered with plates; there is no auditory orifice. The body is snake-like, and cylindrical; and the head, neck, and trunk are of equal circumference. The body is covered with little square compartments, disposed circularly.

Only one species is known; the MEXICAN CHIROTES, (*C. canaliculatus*, Cuv.) The colour of the upper surface of this animal is yellow, each square having a dash of chestnut; the under surface is white. The eyes are almost imperceptible, covered with transparent skin, but destitute of eyelids. This extraordinary Reptile is eight or ten inches in length: it is a native of Mexico; and was first described by Lacépède, under the title, *Le*

*Cannelé.* We can collect nothing definite, as to its habits.

We now arrive at the genera utterly destitute of limbs, which are usually classed with the serpents, and to which, indeed, they approximate in many of their characters.

Of these, we first notice the genus *Amphisbæna*.

#### GENUS AMPHISBÆNA.

The Reptiles of this genus may be recognised by the head, body, and tail being of the same circumference: there are no limbs. The head is generally blunt, and short; and the muzzle resembles a small arched, or rounded beak. The eyes are rather to be distinguished by the elevation of the thin horny plate which covers them, than by any distinct mark; in some species, however, they may be seen as dark spots through the transparent plate. The skin is marked by square compartments, forming circles round the body.

M. Bibron enumerates ten species, of which one is a native of Guinea, another of North Africa, Portugal, and Spain; the rest are American.

Of the American species, we may notice the *DUSKY AMPHISBÆNA*, (*A. fuliginosa*), and the *WHITE AMPHISBÆNA*, (*A. alba*), which measure nearly two feet in length. In both, the eyes are apparent. These Reptiles bore the ground, like worms, and they move either way with equal facility. They are found in Brazil and Cayenne, and usually tenant the earthy structures raised by the termite ants, which they follow through their winding galleries, for the purpose of feeding on them. (See engraving.)

We have seen several of these animals alive; they are unpleasing in appearance, and destitute of grace or agility in their movements; they crawl slowly along, and languidly twist their bodies when handled, opening their mouth, but making no decided effort to bite.

The natives of Brazil believe, that these animals are

really double-headed, and that, if they be cut in two, the parts divided seek each other, and re-unite. According to Stedman, the flesh of the *Amphisbæna*, dried and reduced to a fine powder, is administered as an infallible remedy in cases of broken bones, or dislocated joints; on the inference, that, as it has the power of uniting its own body, if cut in two, and of healing, in so marvellous a manner, amputation in itself, it has at least the power of curing a simple fracture in another!

The species, described by M. Bibron as a native of Guinea, is termed, by that naturalist, the WHITE-TAILED AMPHISBÆNA, (*A. leucura*.) The GREY AMPHISBÆNA, (*A. cinerea*, Vand.; *A. rufa*, Hempr.,) is found in North Africa, Spain, and Portugal. It leads a worm-like life, in the soft ground, and feeds on insects, etc.; but we know little of its peculiar habits.

#### GENUS LEPIDOSTERON.

This genus is closely allied to *Amphisbæna*; and contains three species, natives of South America.

#### GENUS TROGONOPHIS.

The genus *Trogonophis*, separated by Kaup from *Amphisbæna*, is distinguished by various characters, connected with the teeth, and other parts, from the Reptiles of the latter genus, which, externally, it closely resembles. One species only is known, (*T. Wiegmanni*, Kaup,) a native of Northern Africa.

#### GENUS OPIISAURUS.

We shall conclude this family with the genus *Ophisaurus*, which, excepting in the total absence of limbs, is closely allied to the genus *Pseudopus*, (the *Scheltopusik*.) With the head of a Lizard, the single species of this genus has the body of a snake, and the snake-like manners which such a form necessarily involves. It is generally considered as belonging to the serpents, and is regarded in this light by Linnæus and Cuvier.



AMPHISBÆNA.





This animal, the GLASS SNAKE of Catesby, (*Ophisaurus ventralis*, Daud.,) so called, in allusion to its extreme brittleness, is a native of Carolina, and the southern provinces of the United States of America. It is harmless and timid; and feeds on insects, and small reptiles, frogs, etc. It is subject to considerable variation of colouring; a circumstance, which has led to the supposition, that several species exist, which M. Bibron considers a mistake.

We have now, through one series of links, brought the Saurian Reptiles to join the Serpents, or Ophidia; but they also merge into the latter, through another series, which runs parallel to that already described, and which constitutes the family of Scinks, or Scincidæ.

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#### VIII. FAMILY, SCINKS, OR LEPIDOSAURIANS.

THE present family, which concludes the Sauria, commencing with the Scinks, and their allies, passes, through various intermediate forms, to the genera *Anguis* and *Acontias*, containing species which may be regarded as Snakes among Lizards, or Lizards among Snakes.

To the general characters of the Sauria, this family joins many distinguishing peculiarities. The head is covered with large plates, generally angular. The rest of the body is invested with scales, of greater or less magnitude, and of variable forms; but always disposed in a five-fold order, and overlaying each other like the tiles of a house, or, as we see in large-scaled fishes, as for example, the carp. There are no lateral folds, and the scales of the under parts are arranged like those of the back. The tongue is free, fleshy, notched at its point, and covered, either altogether, or in part, with papillæ.

These characters are sufficiently decisive. The large angular plates, for example, which cover the head, do not occur in the Chamæleons, the Geckos, the Varans, or

the Iguanas, though they are present in the true Lizards and the Chalcidians; but the true Lizards have the scales of the under parts always differently arranged from those of the back; and in the latter, the scales are all disposed so as to form circles round the body.

Like the Chalcidians, the posterior part of the head and the neck are of the same thickness, so that there is no interruption, or contraction, between the former and the body. The whole of the surface of the scaling is generally smooth, and polished; hence many of these Reptiles glide easily into small crevices; and they creep, by giving a tortuous, or snake-like motion to the trunk and tail. The limbs are short, where present; they vary in number in different groups, being four, two, or none.

#### GENUS SCINCUS.

The genus *Scincus* is thus characterized. The tongue is notched and scaly; the teeth are conical and blunt, and there are two rows on the palate. The muzzle is wedge-shaped; the scales are smooth and shining, like those of a fish. The limbs are four, with five toes on each foot. The tail is conical and pointed.

The OFFICIAL SCINK, (*Scincus officinalis*), termed *El Adda*, by Bruce, may be selected, by way of example. (See engraving.) This beautiful Lizard is subject to considerable variation in its colouring; its upper parts are usually yellow, or of a silvery grey, mingled with brown and blackish, in transverse marks; the under parts are, generally, of a silvery white.

The Official Scink is peculiar to the northern and and western parts of Africa, and to Syria. It is found in Senegal; Bruce met with it in Syria and Abyssinia; and it abounds in Upper and Middle Egypt, whence most of the specimens seen in collections are derived. In the sixteenth century it was an object of commerce: in ancient times, indeed, it was regarded as an efficacious remedy in various diseases. According to Pliny, it was



OFFICINAL SCINK.



useful for curing wounds made with poisoned arrows ; but, in the middle ages, its supposed virtues were the restoration of the system, weakened by age, and the renovation of strength, exhausted by a career of vice. We need not say, that this Lizard no longer maintains its reputation among the articles of the *materia medica*.

“ M. A. Lefebvre, who collected several of these animals, during his excursion to the Oasis of Barhriah, has communicated to us,” says M. Bibron, “ several observations on the habits of this species, which we cannot omit. According to this zealous entomologist, the Scink is found on hillocks of fine, light sand, which the south-wind accumulates at the bottom of hedges, which border on cultivated grounds, and around the roots of tamarisk trees, which grow on the confines of the desert : it may be there seen quietly basking in the rays of the sun, when their heat is intense, and, from time to time, giving chase to beetles and other insects, which happen to pass near it. It runs with considerable rapidity ; and, when alarmed, it buries itself in the sand with singular quickness, burrowing, in a few moments, a gallery of many feet in depth. When caught it struggles to escape, but neither attempts to bite, nor to defend itself with its claws.”

From the *Scincus*, several sub-genera have been separated by various authors ; as, for example, the section, termed by Mr. Gray, *Tiliqua*, which is characterized by the absence of teeth on the palate ; to which may be added the genera *Eupupes*, *Plestrodon*, *Lygosoma*, and others.

#### GENUS TRACHYSAURUS.

New Holland produces a Lizard, the sole example, as far as known at present, of the genus *Trachysaurus* ; so termed from being covered with large, rough, hard scales, which form a strong coat of mail. The species called the ROUGH SCINK, (*Trachysaurus rugosus*, Gray,) attains to a large size, and is very singular in its appearance (See engraving.) Of its habits, little is ascertained.

## GENUS SEPS.

Passing through several genera, we arrive at the genus *Seps*, in which the form is snake-like, being greatly elongated, but still provided with four limbs. These are very small, and have each three toes, of unequal length. There are no palatal teeth.

One species only is known, the COMMON SEPS, (*Seps chalcides*, Bonap.) This curious Reptile, which, except in the possession of limbs, resembles the Slow-worm, (*Anguis fragilis*), is a native of the south of France, of Spain, of Italy, the islands of the Mediterranean, and the adjacent coast of Africa. It is subject to great difference of colour, and, also, as it would appear, of size; for, according to Latreille, it is not more than six inches long in France; but in Sardinia, and the warmer parts of Europe, attains to twelve or fourteen inches. The anterior limbs are very short, measuring only a few lines in length; the posterior are somewhat longer; but they serve to assist the creature in its tortuous mode of progression. It feeds on worms, slugs, and insects. It produces its young alive, like the Slow-worm.

At one time, the Seps was supposed, by naturalists, to be a poisonous animal; and is still so regarded by the ignorant. It is, however, perfectly harmless. Latreille, indeed, affirms, but on questionable grounds, that when accidentally swallowed by cattle, it is injurious. He says, that in Sardinia, oxen and horses, which happen to swallow it, among the herbage on which they are feeding, become swollen, and are sometimes in danger of dying, unless a mixture of oil, vinegar, and sulphur, be forced down their throats. It appears, notwithstanding this statement, which we entirely discredit, that fowls may swallow it with impunity.

The Seps is very much affected by the diminution of the summer heat; and, accordingly, it retreats early to its winter dormitory, which is a hole in the ground,





TRACHYSAURUS, OR ROUGH SCINK.



burrowed to a considerable depth. In spring it emerges; and lives, during the summer, in sunny spots, covered with herbage and underwood.

The most common colour of this Reptile is a coppery, or bronzed grey on the upper surface, with a longitudinal white line, spotted with black, running down each side of the back; the under surface is grey or whitish.

#### GENERA HETEROMELES, ETC.

In the genus *Heteromeles*, which is separated from *Seps*, there are only two toes on the anterior limbs; three on the hinder. One species is known, a native of North Africa, and especially the neighbourhood of Algiers; it is the *H. Mauritanicus* of Bibron. In the genus *Chelemeles*, the toes are only two on each foot; in *Brachymeles*, there are only rudiments of toes on the anterior limbs, none on the posterior. All these genera contain snake-like Reptiles, closely allied to *Seps*.

#### GENUS BRACHISTOPUS.

In the genus *Brachistopus*, of which the only species as yet known, has been recently discovered in South Africa, by Dr. Smith, the anterior limbs are simple appendages; the posterior have each two toes.

#### GENUS EVESIA.

In *Evesia*, of which one species, belonging to India, is known, the limbs are all reduced to little footless stylets, or appendages.

#### GENUS SCELOTES.

In the genus *Scelotes*, (*Bipes*, Cuv.), there are no anterior limbs, and the posterior are divided into two toes. One species, (the *S. Linnæi*, Bibr.; *Anguis bipes*, Linn.) is known: it is a native of South Africa.

#### GENUS HYSTEROPUS.

The genus *Hysteropus*, (*Bipes*, Cuv.) presents us with one species, from New Holland, resembling a long and slender snake, with two posterior limbs, in the form

of short, flattened appendages. (See our engraving of this curious and snake-like Reptile.)

South America presents us with the *CARIOCOCCA*, (*Pygopus cariococca*, Spix; *Ophiodes striatus*, Wagler,) in which the posterior limbs, the only pair possessed, are, as in the latter genus, small, flattened rudiments. Through these snake-like animals, in which we find the limbs removed by a regular series of gradations, and the body gaining a corresponding serpent-like countour, we pass to the ultimate genera of the Saurians, in which all trace of limbs has disappeared, and which conduct us to the true Snakes, or Ophidia.

#### GENUS ANGUIS.

Of these genera, the first to be noticed is that termed *Anguis*; this includes the well-known Slow-worm of our island.

The genus *Anguis* is characterized as follows:—The body and tail are cylindrical, and snake-like; the tail is blunt; the head is covered with plates; the body and tail with smooth, imbricated scales. There are no limbs. There are no teeth on the palate. The eyes are very minute. One species is known, the SLOW-WORM, or BLIND-WORM, (*Anguis fragilis*, Linn.,) which is found over the greater portion of Europe, and the adjacent parts of Asia, as well as on the line of Africa bordering the Mediterranean. (See engraving.)

This harmless Reptile is very common in many parts of England; it is timid and sluggish, and subject to variation in its colouring. It frequents sunny places, where it delights to bask in the rays; and is then easily caught. In the autumn it retires to its burrow, under decayed masses of wood, fallen trees, half buried in the ground, or heaps of leaves, and often works its way to a considerable depth in the soft soil; its “smooth, rounded muzzle, and even, polished body,” as Mr. Bell observes, facilitating its passage.

“This Reptile,” says M. Latreille, “usually lives



HYSTEROPUS









SLOW WORM.

in the earth, inhabiting holes, which it bores, and which it enlarges with its muzzle. It comes up for the purpose of breathing, raising its head above the surface of the earth in which it has established its retreat. It does this sometimes in winter, though snow may be on the ground. I have found it early in the spring under moss and stones."

When irritated, or alarmed, the Slow-worm, by a forcible contraction of all the muscles of its body, becomes perfectly stiff, and then breaks in two with the slightest blow, or upon any attempt to bend it. Hence the term *fragilis*, (brittle,) given to it by Linnæus. This stiffening is the only manifestation of anger which it displays, at least, generally; we have often taken hold of this Reptile, and carried it about, without its making any effort to bite; which, when much irritated, it will certainly do; but, even then, so small is its mouth, and so feeble are its teeth, that it cannot inflict any injury. M. Latreille says, its food consists of worms, beetles, frogs, small rats, and, as it is said, even toads. This is a mistake. Mr. Bell informs us, that he repeatedly offered, but in vain, young frogs to the Blind-worms, which he kept alive: they refused even insects. With regard to frogs and rats, it is absolutely impossible for the Slow-worm to swallow them. It does, however, feed on insects, earth-worms, and slugs; being particularly partial to the latter. Mr. George Daniel, in Mr. Bennett's edition of "White's Selborne," gives us the following interesting account:—

"A Blind-worm, that I kept alive for nine weeks, would, when touched, turn and bite, although not very sharply: its bite was not sufficient to draw blood, but it always retained its hold until released. It drank sparingly of milk, raising the head when drinking. It fed upon the little white slug, so common in fields and gardens, eating six or seven of them, one after the other. It invariably took them in one position. Elevating its head slowly above its victim, it would suddenly seize the

slug by the middle, in the same way that a ferret, or dog, will, generally, seize a rat by the loins. It would then hold it thus, sometimes for more than a minute, when it would pass its prey through its jaws, and swallow the slug head foremost. It refused the larger slugs, and would not touch either young frogs or mice. Snakes kept in the same cage took both frogs and mice. The Blind-worm avoided the water; the Snakes, on the contrary, coiled themselves in a pan containing water, which was put into the cage, and appeared to delight in it. The Blind-worm was a remarkably fine one, measuring fifteen inches in length. It cast its slough while in my possession; the skin came off in separate pieces, the peeling from the head being completed the last."

Mr. Bell observes, that the shedding of the skin of the Blind-worm takes place as in the true snakes. It is, in fact, taken off in one piece, when the animal is at liberty, and strong enough to effect it; and like those Reptiles, "it leaves the skin turned inside out, attached to brushwood, or other substances, which it has employed to entangle and secure, as it was coming off." The truth of this statement we can attest.

The Blind-worm produces its young alive, in the month of June, or July: they amount to ten or twelve in number, and are soon active and lively.

The general colour of this animal is yellowish brown, or yellowish grey, with a pearly lustre; a dark, or black line runs down the middle of the back, and one or two parallel rows of small, dark spots down each side; but these are not always to be seen. The under parts are of a bluish black, with whitish reticulations.

#### GENUS ACONTIAS.

From the genus *Anguis* is separated the genus *Acontias*, in which the muzzle, which is conical, is sheathed in a large, single case, or horny masque; on each side of which open the nostrils. The tongue, as in the Blind-worm, is flat, and like an arrow-head, with scarcely any



ACONTIAS MELEAGRIS.



RINGED SNAKE.





notch at the tip. The teeth are small; none exist on the palate. There is only a single eyelid, and this is the lowermost, as we term it, where there are two. The tail is blunt. The scales are smooth, and imbricated.

One species only is known, the *ACONTIAS MELEAGRIS*, (see engraving,) a native of the Cape of Good Hope. The *ACONTIAS CÆCA* of Cuvier, also from Africa, forms the type of a distinct genus, termed Typhline by Weigmann.

#### GENUS TYPHLOPS.

We conclude with the genus Typhlops, which ought rather, perhaps, to be placed on the side of the snakes, than at the termination of the Saurian Reptiles.

Like the Blind-worm, the Reptiles belonging to this genus are covered with small, imbricated scales; the eyes are visible beneath the skin, as little dark dots; the head is covered with plates; the muzzle is prominent; the tongue, like that of true snakes, is long, extensible, and forked.

“These little snakes,” says Cuvier, “resemble, at a first glance, common earth-worms. Species are found in the hot regions of the old and new world. They are burrowing Reptiles, living much in the ground.”

Here, then, we close the Sauria; having advanced, through the different groups composing this order, to the Serpents, or Ophidia, which will next engage our attention.

## ORDER III.—OPHIDIA, OR SERPENTS.

“HIS HAND HATH FORMED THE CROOKED SERPENT,” *Job xxvi. 13.*

THE order OPHIDIA abounds in species, which are arranged in various, and somewhat unsettled, genera; presenting no trifling amount of labour to the naturalist who engages in a study of this group of Reptiles. We shall not, however, attempt to enter minutely into details, which would confuse, rather than instruct, our readers, but content ourselves with generalities, as best adapted to the object in view.

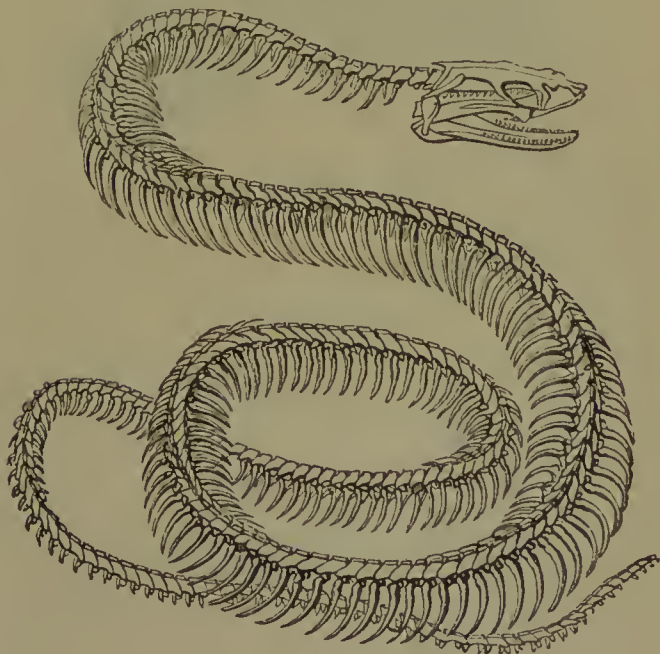
The characters of the Ophidia may be summed up as follow :—With an elongated form, is conjoined not only great flexibility, but amazing strength. The upper surface is covered with narrow and somewhat pointed scales, of small, or moderate size, imbricated, or disposed like tiles; these are called *squamæ*. The under surface is covered with broad, transverse scales, or plates, termed *scuta*; of which, the posterior edge of one overlays the anterior edge of the other.

Generally, the top of the head is covered with plates. The eyes are not protected by movable eyelids, or by a *membrana nictitans*, but the epidermis covers the cornea, as it does the scales; and the whole of this delicate, pellucid membrane is shed whole, and renewed every year: it is commonly called the *slough*.

There are no true limbs: there are not even the rudiments of an anterior pair beneath the skin; but a vestige of posterior limbs, in the form of small hook-like stylets, sometimes exists, as in the Boa. No external auditory orifice is to be seen.

If we pass from merely external characters, and examine the internal framework, or skeleton, we shall find it extremely simple. It consists of the skull, the vertebral column, and the ribs. The breast-bone is wanting, as are, also, the bones of the hips, and of the limbs; excepting where the hinder pair are not altogether lost,

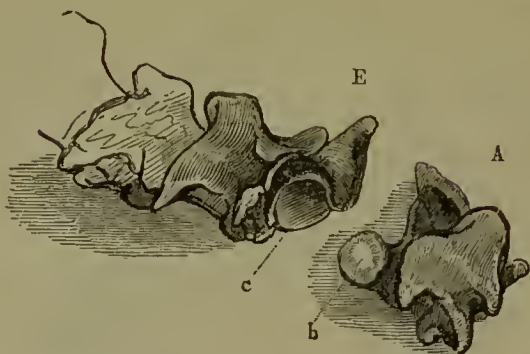
when a few slender bones are found, the rudimentary representatives of the pelvis, and bones of the thighs and legs, as we see them in higher animals. The skeleton of a Snake is very elegant, and at once conveys to our minds an idea of flexibility; and this is borne out by an examination of its component parts.



SKELETON OF A SNAKE.

On turning to the vertebral column, we find it to consist of a series of bones united to each other, by ball and socket articulations; the head of each separate vertebra being received into a deep, cup-like cavity of the one succeeding it. The whole of the spine is, in fact, a chain of these joints, firmly locked together, and each moveable to such an extent, as is compatible with the safety of the spinal chord. On referring to the sketch, this description will be better understood.—

A, is one of the vertebræ, removed to show the arti-



culating ball, *b*, which is fitted into the cup, *c*, of the next vertebræ, *E*.

The Snake is capable of twining in the most extraordinary manner; but, after all, its pliability consists less in the mobility of each joint separately, great as this may be, than in the number of joints into which the column is divided. From each of these distinct bones, (those of the tail excepted,) forming the vertebral column, and which are so numerous, (amounting, in some species, to more than three hundred,) two ribs arise, one on each side, (see skeleton of *Serpent*.) These ribs form a great portion of a circle, so as to embrace nearly the whole circumference of the body, and are the efficient agents of locomotion. They play each on a convex protuberance of the respective vertebræ, and are acted upon by powerful muscles, which move them backwards and forwards. Instead of being attached by their extremity to a breast-bone, as in *Mammalia* and lizards, each pair of ribs is connected with one of the scuta of the under surface, by means of a slender cartilage. It is on the points of these ribs, which may be likened to the limbs of a millipede, that the weight of the Snake rests; and they work in progressive order, like the legs of that creature. While the muscles, after each progressive stroke, keep the anterior ribs firm, the body, by the action of the rest in rotation, is brought up in a series of undulatory move-

ments, the anterior ribs at the proper instant taking up their work. The ribs move, of course, in pairs, and each pair as it is advanced, carries forward with it the scale to which their extremities are fixed; so that each of these scales may be regarded as a broad firm termination, or foot, common to a pair of ribs; and their projecting edges, laying hold of the ground, become a fixed point for the advance of the body. If a Snake be allowed to crawl over the hand, the progressive movement of the ribs, and the advance and application of the edge of each scale may be distinctly felt. The same may be seen when a Snake crawls over the back of a book, or any raised edge requiring the firm application of only one or two scales at the same instant.

The ordinary motion, then, of the Snake, is by a succession of short steps, taken by its numerous ribs, as we see when looking at a millipede; the foot of these ribs (we might say limbs) being a broad scale, common to each pair. A more rapid progress, however, is effected by the body being thrown into great curvatures, the fore part being fixed, and the rest being brought up by the action of the muscles and ribs; the hind part, or tail, being then fixed, and the fore part projected forwards, and so on alternately. In this manner, the Snake can glide along with great velocity, the body assuming a series of rapid undulations from side to side. These animals, however, can also proceed in a series of bounds. The body is raised in the form of an arch, with the head and neck on the one part, and the tail on the other, touching the ground; the tail is brought up to the head, and fixed, the head is raised, then darted forwards, and again fixed, the back arched, and the tail brought up as before.

Many Serpents can spring vigorously and suddenly, and thus dart upon their enemy. In order to do this, they generally first coil themselves up, in a spiral manner, by the contraction of the muscles of one side; then by the sudden relaxation of these muscles, and the violent

and instantaneous action of the muscles of the other side, which uncoils them, they are propelled with great quickness, and to a considerable distance. When a spiral spring, the coils of which are distant, is pressed upon the table till they close, and suddenly released, we see a similar projectile impulse given.

We shall now pass to a consideration of the skull of Serpents, as far, at least, as regards the general mechanism of its structure.

The Snake, as is well known, is capable of swallowing its undivided food, many times larger in bulk than the circumference of its own body; nay, the disproportion, in this respect, is almost incredible. That the skin, the gullet, and the stomach, are capable of enormous dilatation, is a wise provision in its favour: but with every allowance for the dilating powers of the skin and viscera, a difficulty still remains; namely, the passage of the food through the jaws.

Here we see one of the beautiful instances of harmony, which are ever apparent in the works of the Almighty. The bones forming the jaws and face (so to call it) of the Snake, unlike what is seen in Mammalia, where they are firmly locked together, and where the lower jaw moves on closely bound hinges, are all loose and unconnected, except by skin and ligaments. The upper jaw is in two pieces, with a separate intermaxillary bone between the points of each; and the bones of the face, continuing in their state of elemental subdivision, are all disunited. The lower jaw is also composed of two distinct lateral branches, each branch being, in fact, itself made up of two portions, united by a loose kind of suture. Instead of being secured by firm points to the skull, the lower jaw is attached on each side, by a lax articulation, to a moveable bone, called the *tympanic* portion of the temporal bone. The articulation admits of a natural kind of dislocation, so that it gives way in the act of swallowing, and recovers itself when the prey is fairly engulfed. The annexed figure represents the



upper view of the skull of the Python of Java, a Serpent of enormous magnitude; and shows the manner in which the bones are all subdivided. The skull is attached to the first vertebra by a single condyle only. Such is the general plan of construction in the Serpent's skull: there is, it is true, considerable modification of details, in different species, but the great outline is the same.



SKULL OF PYTHON.

Serpents may be characterized as poisonous, or venomous, that is, producing death by their bite; or as innoxious, that is, producing by their bite no mischief beyond the wound itself.

Among the innoxious tribe, we may place the Boa, the Python, the common Snake of England, and many more. These all possess a double row, on each side, above, of sharp-pointed teeth, regularly inclined backwards, so that the hand may be passed down over them with impunity, but not drawn back; for then, they pierce the skin immediately. Hence, while they offer no impediment to the passage of food, they securely detain the struggling victim. Of this double row of teeth, on each side, above, one runs along the jaw bone, the other along the bone of the palate.

The cut on next page represents the under surface of

the skull of the Python, and clearly shows the formidable array of fangs.

In each ramus, or branch of the lower jaw, there is but a single row, as seen in the following lateral view of the skull of the same Python. In this view, the suture dividing each ramus of the lower is also exhibited, as well as the tympanic bone, with which the jaw is articulated.

In poisonous Serpents, such as the Rattlesnake, the Cobra, the Viper, and others, the teeth are somewhat differently arranged. It is usual to hear persons talk of the Serpent stinging: the Serpent, however, has no sting; the fatal wound is produced by a bite.

If we examine the jaws of a poisonous Serpent, we shall find the bones forming the upper jaw to be small,



UNDER SURFACE OF SKULL OF  
PYTHON.



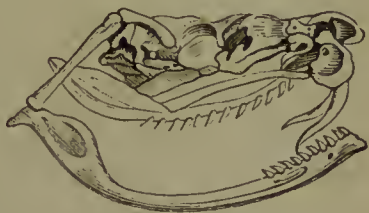
LATERAL VIEW OF SKULL OF PYTHON.

and freely moveable upon an osseous peduncle, (the

external pterygoid process of the sphenoid bone,) directed backwards. In each branch of the upper jaw, is a long, recurved, pointed tooth, traversed by a canal, leading from a large gland, situated beneath the eye. Thus the fluid secreted by this gland, passes through the tube into the bottom of the wound which the **poison-fang** inflicts.

When not required for use, these fangs lie concealed in a fold of the gum; but when about to bite, the Snake raises them up, and in the act of biting, compresses the poison glands by means of a peculiar muscle for the purpose, and so instils a few drops of the deadly fluid into the puncture. These are the only teeth truly seated in the upper jaw; the others above are ranged on each side, along the bones of the palate. The branches forming the lower jaw are slender, and but partially furnished with teeth.

The annexed figure, a lateral view of the skull of the Rattlesnake, will render the above details intelligible.



SKULL OF RATTLESNAKE.

There is something more than usually repulsive in the aspect of poisonous Serpents: their thick, broad head, their wide jaws, armed with horrible poison-fangs, together with their brilliant eyes, give them a ferocious expression; and man and beast instinctively recoil from their presence.

It is, however, much to be doubted, whether all poisonous Serpents have the peculiar fangs we have described: many species, destitute of these fangs, have back teeth of great size, and grooved, and possess a large maxillary gland; and such Snakes are considered, in the countries they inhabit, to be exceedingly poisonous: the truth of this opinion is said to be too often proved by the sad experience of the natives, and has been

confirmed by the direct experiments of naturalists of great eminence.

It is in the hotter regions of the globe, the great nursery of the Reptiles, that the Ophidia abound. There, tangled forests, impenetrable jungles, morasses teeming with luxuriant vegetation, and mouldering ruins overgrown with brushwood and creeping plants, are their favourite places of abode. There they swarm; there the gigantic Python rears his resplendent form; and there, thousands of every hue and size astonish or alarm the traveller.

The naturalist, then, who wishes to study personally the habits and instincts of this dreaded race, must betake himself to a tropical climate, where one species or another will arrest his attention wherever he goes. Some he sees, slender as whipcord, and of great length, twined around the boughs and twigs of trees and shrubs; their tints amalgamating with the colour of the foliage which conceals them: rapidly and silently they glide among the branches, even to the tops of the highest trees, in pursuit of insects, and of eggs, or the young of birds. Of these slender, arboreal Snakes are several genera, as *Dendrophis*, *Dryinus*, and *Dryophis*. Others he beholds darting along the ground; they cross his path, and plunge amidst the jungle, ere his eye can catch their colours; and a loud hiss of anger warns him not to follow. Let him take his way along the mazes of the river, or track the borders of the lake; there may he mark the mighty Boa, its tail twined around a tree, or mouldering log, and its body floating on the surface of the water, in undulating curves, or half hidden amidst the aquatic herbage, as it lurks in ambush, till evening brings the deer, or antelope, to drink. Sudden as the lightning's flash, the monster envelopes the helpless prey in his heavy folds, and straining, crushes every bone to pieces. When the last feeble efforts of the victim have ceased, the Snake, slowly uncoiling, proceeds to

gorge the carcass, swallowing it by degrees; while the jaws, distended by the effort, are reeking with saliva.

Such are the spectacles which the naturalist in these regions may witness;\* but he may experience danger from the huge Hamadryas, Bungarus, or Cobra; Serpents formidable, not only from their size, but from their poison fangs, which render them far more terrible than the Boa, which is to be dreaded only for its strength and impetuosity.

Were all Snakes poisonous, their existence would be a sore evil; they would be the scourge of the countries which are tenanted by them: happily, however, all are not dangerous, either in consequence of their vast powers, or of their venom. Multitudes are harmless, at least, as far as man is concerned; and many are as beautiful in their colouring, as graceful in their forms. Still few, or none, are favourites.† Some nations, it is true, have regarded certain species with a kind of religious homage; but man is evidently at enmity with them. There is something repulsive about their appearance and movements; the fixedness of their gaze; the fiery glistening of their eyes; the unalterable expression of cunning

\* "In the Dutch colonies of the East Indies, André Cleyer purchased, of the hunters of the country, an enormous Serpent, in the body of which he found a deer of middle age, altogether entire, with its skin and limbs. In another individual of the same species, also examined by this traveller, a wild he-goat was found with its horns; and a third, had evidently swallowed a porcupine with its quills. He also adds, that a pregnant woman became the prey of a Reptile of the same genus, in the island of Amboyna; and that this kind is sometimes kept for the purpose of attacking buffaloes, in the kingdom of Arracan, on the frontiers of Bengal. We need hardly be astonished at this, when Prince Maurice of Nassau Siegen, one of the governors of Brazil, in the seventeenth century, assures us, that he himself was an eye-witness of stags, and other bulky animals, and even of a Dutch woman, being devoured in this manner, in the region of South America, where he commanded. Father Gumilla, in his "History of the Orinoco," recounts analogous facts concerning a Serpent, which he calls Bajo: and a multitude of others of the same kind may be found in the works of travellers."—Griffith's Transl., Cuv.

† The common Snake of England may be domesticated; and the Coral Snake of Florida, which is very beautiful and gentle, is often kept tame.



and ferocity; their winding, silent, and insidious mode of progress; the rapid, noiseless manner in which the head, towering aloft, as elevated on the look-out for prey, is instantly lowered on the approach of the victim; their subtleness; their daring; their predatory habits; the poison of many; the unconquerable strength of others; all combine to render them objects of alarm or aversion.

The voice of Serpents, which is often exerted, is a hiss, more or less loud, or piercing: it is the announcement of anger, or impatience, the warning of an attack, the signal of defiance.

The duration of life in Serpents is very great; but we know of no experiments or observations, which can enable us to state the natural age to which any arrive; but it must be years before a Boa, or Python, which, when first excluded from the egg, is not more than twelve or fourteen inches in length, attains to the length of twenty-five or thirty feet.

They are extremely tenacious of life, and will survive severe wounds. Instances have been known, in which the head, severed from the body, has, after a considerable time, not only retained vitality, but bitten with fury.

Serpents pass the colder season in a state of hibernation; and numbers often collect, and intertwine themselves together, in their retreats; no doubt for the sake of the warmth, which they thus communicate to each other. They rouse from their lethargy in spring; but, strange to say, and the observation applies to many other Reptiles, their torpidity ceases, as M. Latreille observes, when the atmospheric temperature is at the same degree as when they sought their retreats. "The electric fluid, one of those great agents in the animation of living beings, in conjunction with the warmth, operates in rousing these Reptiles from their inactivity. They have more vital energy at the commencement of spring, than on the approach of winter, because they are susceptible of being, more or less, animated by the electric fluid; the



action of which is less decided in autumn than in spring." The influence of electricity, upon hybernating animals, is not confined to Reptiles. The tanrec, a quadruped of small size, and allied to the hedgehog, may be instanced. In the Mauritius, (of which island the animal is a native,) the tanrecs "sleep through the greater part of the winter, from April to November; and they are only to be found when the summer heat is felt, which being, generally, ushered in by an electric state of the atmosphere, the negroes (with whom they are a favourite food) say they are awakened by the peels of thunder which precede the summer storms, or *pluies d'orage*." (See Proc. Zool. Soc., June 14, 1831.)

Soon after their revival, Serpents generally cast their slough, or external skin. Mr. Bell observes, that it is a mistake to assign a particular period to the process. "Some have stated it to occur once, some twice, in the summer; but I have found it to depend, in our common Snake, upon the temperature of the atmosphere, and on the state of health, and on the more or less frequent feeding of the animal. I have known the skin shed four or five times during the year. It is always thrown off by reversing it; so that the transparent covering of the eyes, and that of the scales also, are always found concave in the exuviae. Previously to this outward change, the whole cuticle becomes somewhat opaque the eyes are dim, and the animal is evidently blind. It now becomes, more or less, inactive; until at length, when the skin is ready to be removed, being everywhere detached, and the new skin perfectly hard underneath, the animal bursts it at the neck, and creeping through some dense herbage, or low brushwood, leaves it attached, and comes forth in far brighter and clearer colours than before."

The ancients, whose fertile imagination led them to embellish every thing, considered this rejection of the slough, and acquisition of a brighter robe, as a re-assumption of youth—a sign of a renovated state of

existence—a throwing off of old age. They regarded these animals as leading a protracted life, of annually renewed vigour and beauty.

It is a popular opinion, of long standing, that Serpents are capable of exercising a fascination on their intended victims, by which they are gradually drawn to the very jaws of their enemy. This fascination is supposed to depend either upon the fixed gaze, with which the Serpent regards its devoted prey, or upon some “subtle emanation” from its body. We know, indeed, that Serpents exhale a disgusting odour, especially after gorging themselves with food; but this odour, once believed to be baleful in the extreme, endows the Snake with no properties of attraction; nor yet can its gaze produce the effect in question. The fact is, there is no truth in the story of fascination, as the word is commonly understood; and the cases, which seem to favour the opinion, are all to be explained very satisfactorily, on other grounds.

Fear, amounting to panic, solicitude for its young, and efforts to drive away the dreaded intruder, leading the bird to venture too closely to the Snake for its own safety, produce the results erroneously attributed to the Reptile’s fancied power of fascination by its glance, or by some mystic property.

Dr. Barton, of Philadelphia, published, in 1796, a memoir on the fascinating faculty ascribed to Snakes, from which we take the following interesting extracts:—

“In conducting,” he says, “my inquiries into this curious subject, I endeavoured to ascertain the two following points: namely, first, what species of birds are most frequently observed to be enchanted by the Serpents; and, secondly, at what season of the year has any particular species been the most commonly under this wonderful influence. I supposed that this would furnish me with a clue to the whole mystery.

“Birds have an almost uniform and determinate method of building their nests; whether we consider the

form of the nest, its materials, or the place in which it is fixed. Those birds which build their nests upon the ground, or the lower branches of trees, and in low bushes, especially on the sides of rivers and creeks, that are frequented by different kinds of Serpents, have, most frequently, been observed to be under the enchanting faculty of the Rattlesnake, and others. Indeed, the bewitching spirit of these Serpents seems to be almost entirely limited to these kind of birds. Hence, we so frequently hear tales of the fascination of the cat-bird, (a species of thrush,) which builds its nest in low bushes, on the sides of creeks and other waters; the most usual haunts of the Black Snake, and other Serpents. Hence, too, upon opening the stomachs of some of our Serpents, if we often find that they contain birds, it is almost entirely those birds which build in the manner I have mentioned.

“The Rattlesnake seldom, if ever, (never,) climbs up a tree. It is frequently, however, found about the roots, especially in wet situations. It is said to be often seen, curled round a tree, darting terrible glances at a squirrel; which, after some time, is so much influenced by these glances, or by some subtle emanation from the body of the Serpent, that the poor animal falls into the jaws of its enemy.

“Is the animal’s fear and distress a matter of any wonder? Instinct has taught different animals, what are their enemies; and as the Rattlesnake occasionally devours birds and squirrels, to these animals it must necessarily be an object of fear. In almost every instance, I have found that the supposed fascinating faculty of the Serpent, was exerted upon the birds at the particular season of their laying their eggs, or of rearing their young: I now began to suspect, that the cries and fears of birds supposed to be fascinated, originated in an endeavour to protect the nest, or young. My inquiries have convinced me that this is the case.

“I have already observed, that the Rattlesnake does

not climb trees ; but the Black Snake (*Coluber constrictor*, Linn.) and some other species of the Coluber do. When impelled by hunger, and incapable of satisfying it, by the capture of animals on the ground, they begin to glide up trees, or bushes, in which a bird has its nest. The bird is not ignorant of the Serpent's object. She leaves her nest, which contains the eggs, or young ones, and endeavours to oppose the Reptile's progress. In doing this, she is actuated by the strength of her instinctive attachment to her eggs, or of affection to her young. Her cry is melancholy ; her motions are tremulous ; she exposes herself to the most imminent danger. Sometimes she approaches so near the Reptile, that it seizes her as its prey. But this is far from being universally the case : often she compels the Serpent to leave the tree, and then returns to her nest.

“ It is a well-known fact, that among some species of birds, the female, at a certain period, is accustomed to compel the young ones to leave the nest ; that is, when they have acquired so much strength, as no longer to need all her care, though they still claim some. Their flights are awkward, and soon broken by fatigue : they fall to the ground, when they are frequently exposed to the attacks of the Serpent, which attempts to devour them.

“ In this situation of affairs, the mother will place herself upon a branch of a tree, or a bush, in the vicinity of the Serpent : she will dart upon the Reptile, in order to prevent the destruction of her young ; but fear, the instinct of self-preservation, will compel her to retire. She leaves the Serpent but for a short time, and then returns again. Oftentimes she prevents the destruction of her young, attacking the Snake with her wing, her beak, or her claws.

“ Should the Reptile succeed in capturing the young, the mother is exposed to less danger ; for, whilst engaged in swallowing them, it has neither inclination nor power to seize upon the old one. But the appetite of

the Serpent tribe is great ; the capacity of their stomachs not less so : the danger of the mother is at hand when the young are devoured ; the Snake seizes upon her, and this is the catastrophe which crowns the tale of fascination.

“ Some years since, Mr. Rittenhouse, an accurate observer, was induced to suppose, from the peculiar melancholy cry of a red-winged maize-thief, (a species of starling,) that a Snake was at no great distance from it, and that the bird was in distress. He threw a stone at the place from which the cry proceeded, which had the effect of driving the bird away. The poor bird, however, immediately returned to the spot. Mr. Rittenhouse now went to the place where the bird alighted, and, to his great astonishment, he found it perched upon the back of a large Black Snake, which it was pecking with its beak. At this very time, the Serpent was in the act of swallowing a young bird, and from the enlarged size of the Reptile’s body, it was evident that it had already swallowed two or three other young birds. After the Snake was killed, the old bird flew away.

“ Mr. R. says, that the cry and actions of this bird were precisely similar to those of a bird which is said to be under the influence of a Serpent. The maize-thief builds its nest in low bushes, which are the usual haunts of the Black Snake.”

Mr. Bartram, in a note quoted by Wilson, in his “ American Ornithology,” says, “ Yesterday I observed a conflict, or contest, between a cat-bird and a Snake. It took place in a gravel walk, in the garden, near a dry wall of stone. I was within a few yards of the combatants. The bird pounced, or darted upon the Snake, snapping its bill ; the Snake would then draw itself quickly into a coil, ready for a blow ; but the bird would cautiously circumvent it, at a little distance, now and then running up and snapping at it, but keeping at a sufficient distance to avoid a blow. After some minutes, it became a running fight, the Snake retreating ; and at

last, it took shelter in the wall. The eat-bird had young ones in the bushes, near the field of battle."

In this account, we have a clue to the pretended fascination which Snakes are said to be capable of exerting; the substance of the explanation is, that the bird is terrified, yet urged by instinctive solicitude for her young, exposes herself to imminent peril in their defence, and often falls a sacrifice.

In many countries, and from very early times, the Serpent has been an object of religious veneration. We find traces of this idolatry among the natives of India and Egypt, in remote antiquity. Herodotus states, that "there are about Thebes, sacred Serpents entirely innoxious to man; they are of diminutive size, and have two horns sprouting from the top of the head; and when they die, they are buried in the temple of Jupiter, to whom they are said to be sacred."\*

But it would also appear, that Serpents were regarded as genii, either good or evil, and to be revered, or propitiated. Among the bronze relics of the Egyptians, in the British Museum, is the figure of a Serpent, the Cobra, with expanded hood; and which was, probably, regarded as the image of a deity or genius, or as one of the penates, or household gods.

A Serpent was one of the gods of Babylon, and the mysterious coffer, or basket, which was carried in the ceremonial processions of the heathens, and which the initiated only were permitted to approach, contained, as various medals prove, a living serpent, regarded as an *agathodæmon*, or good genius. With such a superstitious feeling, a Serpent was often placed round the cornucopia, or horn of plenty, and round the staff of Æsculapius, whom indeed the Romans worshipped under that form.

A picture, found in Herculaneum, gives us a Serpent twined round an altar, eating something placed upon it,

\* This description applies very closely to the Cerastes, common in Egypt and Lybia; but this species is poisonous.





CHRISHNA BRUISING THE HEAD OF THE COBRA.



with a youth apparently worshipping it ; an inscription by the altar is, "*Genius hujus loci montis.*" Other representations of a similar kind are common.

In Hindoo mythology, the *magas* are large Serpents ; and with these, regarded as malignant genii, the infernal regions are tenanted. Figures of Chrishna (as in the engraving) are often represented, some entwined by a large Cobra, which is fixing its poisoned fangs in the heel : others, in which Chrishna is crushing the head of the Serpent, while he triumphantly tears the creature from his body. The application of the emblem cannot be mistaken ; the great prophetic promise, associated, indeed, with the absurdities and vain superstitions of the Hindoo mythology, is here intended. The Serpent stands as an emblem of the principle of evil, to be ultimately destroyed, with the poison of death itself, by the "Seed of the woman." This great promise, perverted and obscured, but not utterly lost among the heathen, is undoubtedly the origin of the figures of Chrishna : first bitten in the foot, and powerless in the folds of a venomous Reptile ; next crushing its head beneath his feet. The head of the Serpent is, indeed, crushed, not by Chrishna, or any god of idolatry, but by Him who is "the Way, the Truth, and the Life ;" and who, by his own sacrifice, has triumphed over sin and death, and opened for believers the gates of a brighter paradise, where all shall be pure and holy.

The Serpent, however, was not always taken, even by the Israelites, as an emblem or personification of evil. For when in the wilderness, the people were bitten by "fiery flying serpents,"\* Moses, by the command of God, made "a fiery serpent" (*seraph*) "of brass," and put it on a pole, that those who looked upon it might live. To this act our Saviour makes an express reference, which renders the application clear : "As Moses lifted up the serpent in the wilderness, even so must the Son

\* The Hebrews termed these fiery Serpents, *Seraph*, from a root which signifies to burn ; probably, from the burning pain occasioned by their fatal bite : it may, also, be from their vivid colouring.

of man be lifted up: that whosoever believeth in him should not perish, but have eternal life," John iii. 14, 15. In this comparison, we learn the poisonous and deadly nature of sin, like the bite of a fiery flying serpent: also the power of Christ lifted up on the cross to save whosoever shall believe on him. And now, He who was once lifted up on the cross, is exalted to his throne, and is able to save unto the uttermost those that come unto God by him. Let every reader of these pages look to Him.

That the turning to this serpent of brass was not then accompanied with religious worship, we may readily believe; but, being preserved, it was soon afterwards regarded as a sort of idol, when the Israelites became idolatrous in their practices: hence it was broken up by Hezekiah. "He removed the high places, and brake the images, and cut down the groves, and brake in pieces the brazen serpent that Moses had made: for unto those days the children of Israel did burn incense to it: and he called it Nehushtan," 2 Kings xviii. 4.

It was not only among the nations of the old world that Serpent worship existed, the Mexicans adored the Boa, and regarded it as a divinity, offering human sacrifices to it in the blindness of their superstition.

Much more might be said, with respect to the prevalence, at one time, of this idolatrous worship of the Serpent; the subject, however, is not strictly within the bounds of the naturalist; and it is sufficient to have alluded to it.

We shall proceed to consider the Ophidia, or Serpent race, under three divisions: Non-venomous Serpents; Venomous Serpents; and Aquatic Serpents, most of which, if not all, are venomous.

### NON-VENOMOUS SERPENTS.

All are oviparous. Of the non-venomous Serpents, we have in our island one species only, (the Blind Worm, which is not a true Snake, excluded,) but this is very common especially in the neighbourhood of

water. It is the RINGED SNAKE, (*Natrix torquata* Ray; *Tropidonotus natrix*, Kuhl.) and may be regarded as a type of the family Colubridæ, in which the head is covered with broad plates, and the under surface of the tail with a double row of plates, or divided scuta.

The Ringed Snake often attains to the length of three feet, and, sometimes, even more; the head is depressed, and oval, with the gape extending its whole length. The teeth are small; the tongue is long, flexible, and deeply bifid at the point. The plates of the head are broad and flat; the scales of the back and upper parts are oval, and slightly marked with a keel. The tail is long and tapering.

The general colour of the upper surface is greenish brown, or grey, with a tinge of olive, with two rows of small black spots down the back, and a row of larger spots down each side; across the back of the neck, behind the head, is a collar of yellow, or whitish yellow, margined behind with black. The edges of the labial plates (those covering the edges of the mouth) are all margined with black. The under parts are of a leaden blue, marbled with black. The female is larger than the male, a circumstance common to the Serpent tribe generally. (See engraving opposite page 192.)

This active Snake is to be found in copses, among brushwood, and old hedgerows, bordering moist meadows, or water, to which, as we can personally testify, it often resorts, swimming with the head above the surface, the body describing a series of the most graceful, undulatory movements.

That Snakes should swim is not surprising, considering the extent and character of the lungs in these Reptiles, or rather, perhaps, lung, (for one only is greatly developed,) which is carried throughout, or nearly throughout, the general cavity of the body. At its commencement, and for a short distance, the cellular tissue of the lung, presents, when cut into, a maze of close delicate, and beautiful reticulations. These meshes

gradually enlarge, till the whole of the lower part of the lung consists of large cells, or chambers; the membrane being extremely thin and semi-transparent. It is, most probably, only in the upper portion of the lung, that the blood undergoes the change, resulting from its contact with atmospheric air; and, it is to be observed, that the vascular system of this upper and finely reticulated part, is such as to favour this idea, which, if correct, would lead to the conclusion, that the lower portion served exclusively as a reservoir for air. We have often, on inflating the lungs of a Snake, been surprised at the capacity of the lower portion, and the quantity of air it is capable of receiving; and we incline to the belief, that the lung, when filled, is capable of containing a volume of air, which will serve the system for a considerable time, the necessity of taking in a fresh supply every instant, as do birds and Mammalia, being obviated.

Some years since, passing by a small sheet of water, near Ashford, between Bakewell and Buxton, we observed a Snake quietly swimming towards the bank. We hastened to the spot for which it was making. On seeing a man, it stopped, and allowed itself to sink gently to the bottom, a few yards distant from the water's edge. The water was very clear, so that it could be seen distinctly. It lay with its head slightly elevated, and its body partially concealed by a stone; and it was, evidently, watching its observer. It kept its unaltered attitude for more than ten minutes: at last, with a cautious, stealthy movement, it turned round, and rising to the surface, with its head scarcely above it, not elevated, it slowly made its way towards a thick bed of water plants, where all trace of it was lost. The capacity of the lungs, then, not only renders the Snake buoyant in the water, but capable of remaining beneath, for a considerable time, without being obliged to come up for fresh air.

The Ringed Snake produces eggs, which are covered with membrane, resembling parchment; and which are



agglutinated together in a chain, (like a necklace,) to the number of fifteen or twenty. Hotbeds, heaps of manure, and similar places, are generally chosen by the female, in which to deposit them.

We knew a lime-kiln, in Staffordshire, near a canal, regularly in use for burning lime; its thick, sloping sides, presented a mound of rough stone-work and earth, on which grew grass and various plants. On this mound, Snakes were very abundant, attracted by the warmth, which they experienced, during the burning of the lime. All our attempts to catch them were vain, for they disappeared in an instant between the crevices: from these crevices, we several times obtained numbers of their eggs, but always after the young had been excluded. On more than one occasion, we have seen Snakes making their way from the canal through the meadows to this genial retreat. It is very probable that some of them were occasionally burned to death.

The Snake retires to its place of hybernation towards the close of autumn. This is generally under heaps of manure; under masses of felled timber; in holes or crevices sheltered from the cold; and numbers are often found coiled together, in a state of torpidity. When the warmth of spring returns, they emerge from their winter quarters, and commence their active operations.

Mice, young rats, nestling birds, and eggs, together with frogs, constitute the food of the Ringed Snake; it is, also, fond of milk, which it drinks with avidity; and, we have been repeatedly assured, that it is in the habit of creeping into dairies for the sake of obtaining this luxury. Latreille states, that the same practice is attributed to it on the continent; but he considers the assertion, that it robs the dairy, as undeserving of credit. We have, however, been informed by persons worthy of trust, that they have seen it in the act of drinking from the shallow vessels, in which the milk is set "to cream."

That this Snake preys on young nestlings, we can

personally testify; and, also, that the parent birds flutter distressed about the spot, uttering notes of terror and agitation, while the marauder is destroying their progeny. Some years since, passing along an old, closely tangled hedge, bordering a wood, in Cheshire, we saw two small birds restlessly fluttering about a certain part, uttering all the time cries of lamentation; on going to the place, and looking through the branches, we saw a very large Snake, twined in the very centre of the hedge, swallowing an unfledged nestling, which it had taken from the nest, yet containing one or two others, but much disarranged, as if half pulled from its situation. The moment the Snake perceived us, it endeavoured to escape; but the thickness of the hedge so far impeded its movements as to enable us, though with difficulty, to lay hold of its tail: that instant it redoubled its efforts; its tail slipped from our hands, and it disappeared like lightning.

We have, also, seen the Ringed Snake take frogs, a favourite food; and heard the piteous cry of the poor creatures, when seized by their terrible foe. Mr. Bell's description of the mode in which the frog is swallowed is perfectly correct. The Snake pounces upon the frog, and "generally seizes it by the hind leg, because it is usually taken in pursuit. As soon as this takes place, the frog, in most instances, ceases to make any struggle, or attempt to escape. The whole body and the legs are stretched out, as it were convulsively; and the Snake gradually draws in first the leg it has seized, and afterwards the rest of the animal, portion after portion, by means of the peculiar mechanism of the jaws, so admirably adapted for that purpose." We have already alluded to the natural dislocation of the jaws, and the separation of their constituent bones, during the act of swallowing: we may here add, that the jaws (upper and lower) of one side, are capable of being brought into action independently of those of the other; and that their action is alternate. When the Snake seizes its

prey, he protrudes the upper jaw of one side, with the double row of teeth, and the corresponding branch of the lower jaw, and fixes the teeth in the skin; the opposite side is then advanced, of course still farther, and the teeth fixed; and so on alternately, till the prey is engulfed.

When a Snake, having seized a frog by one of the hind legs, swallows it with that leg foremost, the other hind leg, as the body is drawn close to the mouth, is turned back; and, as the process of swallowing continues, one hind foot, and the two fore feet, are the last to disappear.

It often happens, that the Snake seizes a frog by the body; and, in this case, it always turns the frog round in its mouth, and then swallows it head foremost. After gorging itself, the Snake becomes listless and sluggish, and remains so for several days, till the digestion of its food is completed.

The frog is not killed by the Snake before being swallowed, but is generally taken in alive. Mr. Bell assures us, that he saw a very small frog, which a large Snake had swallowed, leap out of its mouth, when it gaped, as the Snake often does after taking food; and, on another occasion, he heard a frog distinctly utter its peculiar cry, several minutes after it had been swallowed. The idea of being swallowed alive by a monster, and dying immured in a living tomb, is horrible.

Mr. Bell relates the following curious anecdote:—  
“ On placing a frog in a large box, in which were several Snakes, one of the latter instantly seized it by one of the hinder legs; and immediately after, another of the Snakes took forcible possession of the fore leg of the opposite side. Each continued its inroads upon the poor frog’s limb and body, until, at length, the upper jaws of the two Snakes met; and one of them, in the course of its progress, slightly bit the jaw of the other; this was retaliated, though evidently without any hostile feeling; but after one or two such accidents, the most powerful of the Snakes commenced shaking the other, which still

had hold of the frog, with great violence, from side to side, against the sides of the box. After a few moments' rest, the other returned the attack; and, at length, the one which had last seized the frog, having a less firm hold, was shaken off, and the victor swallowed the prey in quiet."

The Ringed Snake may be tamed, and rendered familiar towards those accustomed to feed it. In the museum of the Zoological Society of London, a Snake is preserved, which belonged to a Mr. Cristman, who kept it eleven years, and to whom it exhibited the utmost attachment. Mr. Bell informs us, that he kept one which would come to him every morning at breakfast, for a draught of milk; and which would crawl under the sleeve of his coat, and there lie perfectly still, enjoying the warmth. He would fly from strangers, and hiss if they attempted to touch him. A lady, of considerable repute in the literary world, once amused us by some details respecting a female acquaintance of somewhat eccentric habits, who, much to the annoyance of her friends, domesticated a number of Snakes as pets: they recognised her, and would come and wreath themselves around her arms or neck; and often creep over and entwine themselves about her visitors, to their terror and amazement.

The Ringed Snake is an inhabitant of most of the countries of Europe, even as high north as Sweden. It is common in England and Scotland; but it does not appear to be indigenous in Ireland. It is commonly said that there are no Reptiles in Ireland; and that their introduction always fails, none long surviving, being unable to endure the climate or soil.

It is certain that the Sand Lizard (*Lacerta agilis*) exists in Ireland, and the frog is now very common; but with respect to the Snake, the assertion appears to be true. It is true, also, that attempts to introduce the Snake have failed; but not because either the soil or climate is unfavourable, nor yet on account of the influence of St. Patrick's extirpatory malediction, (the com-

mon legend,) but because they are killed by the people. Their absence from Ireland is accidental; and the alarm of the peasantry, when the few, which a gentleman once turned loose, were seen, was ludicrous: a reward was offered for their destruction, and they were all soon despatched.

Exclusive of the Ringed Snake, eighteen distinct species of the Colubrine group, with several varieties, are described by the Prince of Musignano, (Charles L. Bonaparte,) in his work on European Reptiles. Of these we may enumerate the following.

The *NATRIX TESSELLATA*, nearly allied to the Ringed Snake, is very common in some parts of Italy, and in Spain and Germany. It is found in abundance on the borders of a small lake, which fills an extinct crater, near the site of ancient Gabeï. It is extremely shy and active.

The *COLUBER RICCIOLI*, (*Zamenis Riccioli*, Bonap.), a native of Italy and Spain, is remarkable for its beauty and gentleness. It never attempts to bite. It is found in Monte Mario, in the suburbs of Rome; but it is not common. It has also been seen on the banks of the Garonne.

The *COLUBER (Callopeltis) FLAVESCENS* inhabits Italy Germany, southern France, and the Appennines; and attains to a considerable size, many specimens exceeding the length of four feet. It appears to vary greatly in colouring. Lacépède termed a species, *Coluber Æsculapii*, as the animal figured by the ancients upon the statues of that sage, and which is probably referable to the present Snake; but there is no proof that this is the animal dedicated by the ancients to Æsculapius; and, we apprehend, that the true Æsculapian Snake must be sought for in Greece, rather than Italy. The *Coluber Æsculapii* of Linnæus is an American species.

In its habits, the *C. flavescens* very much resembles our Ringed Snake, frequenting moist meadows, and wooded places where water is accessible. It is bold and active.

The COLUBER VIRIDIFLAVUS is found throughout the whole of southern Europe; it grows to four feet in length, and is active and bold. It is extremely common near Rome, living even within the walls of the city; and is useful in destroying rats and mice. Except when irritated, it is very gentle; but when molested, especially while in company with its mate, it darts with anger upon its assailant, endeavouring to bite; and even renews its attack.

The COLUBER (*Elaphis*) QUADRILINEATUS is the largest of our European Serpents; often attaining to six feet in length. It inhabits Italy and Spain. This formidable, though not venomous Snake, is probably the Boa of Pliny; and it was a Snake of this species, according to Metaxa, which is recorded to have swallowed a child on the Vatican mount, in the time of Claudius; the body being taken out of the Reptile's stomach unmutated. A writer in the "Magazine of Zoology and Botany," says, in allusion to this account, "We do not think it at all incredible, and more likely to be true than otherwise. We remember seeing a very young child deposited on the pavement of a church at Lisbon, quite naked, to wait until some charitable person should order it to be buried; and which a very moderate-sized Snake might have swallowed, had such met with it in its haunts." This species varies in colour; when fully adult, it is of an olive tint above, with two brown lines down each side; the under surface is yellowish.

America presents us with the BLACK SNAKE, (*Coluber constrictor*), so formidable to birds, and which may be regarded as the representative in that country of our common English Snake. It is a bold and resolute animal, and obstinately defends itself when attacked. It is reported to fight with the Rattlesnake, strangling the latter in its folds, like the Boa or Python; indeed, its specific name, *constrictor*, is given in allusion to the mode in which it kills its prey. According to Daudin, it may be easily tamed. It causes great destruction among rats and



mice; and, accordingly, is favoured by the inhabitants of farms, and dwellings in the country, who are pleased to see it about their premises. It devours also squirrels, opossums, frogs, lizards, and birds. We may here, also, mention, as peculiar to America, the HARLEQUIN SNAKE, and the GARTER SNAKE, (*C. ordinatus*.)

The Harlequin Snake is found in the southern provinces of the United States. "It glides," says Audubon, "through the grass with ease, and ascends to the tops of bushes, and among the branches of fallen trees, to bask in the sun: children are fond of catching it, on account of its beauty. It feeds principally on insects, such as flies and small beetles."\*

The Garter Snake is very common in the United States, and is found in the meadows and woods. It is active and quick, and often ascends bushes.

#### GENUS CHRYSOPELEA.

The genus *Chrysopelea* contains two described species, one peculiar to Ceylon, the other to South Africa.

#### GENERA PSAMMOPHIS, ETC.

To the Colubrine group belong the genera *Psammophis*, *Coronella*, *Zenopeltis*, *Heterodon*, *Homalopsis*, and others. Many of the species, especially of the genera *Psammophis* and *Coronella*, are remarkable for their beauty; but we know little of their manners.

The arboreal Snakes of the Colubrine section, are divided into several genera, as *Dipsas*, *Dendrophis*, *Dryinus*, *Dryophis*, etc. They are all remarkable for their great activity; and, if any Serpents deserve the epithet "flying," these do. It has been, indeed, believed by many, that Serpents capable of actual flight have existed, or

\* Among other American Snakes of the Colubrine group, are the Coach-whip Snake, (*C. flagelliformis*;) the Ribband Snake, (*C. saurita*;) the Garter Snake of Pennsylvania, (*C. sirtalis*;) the Green Snake, (*C. æstivus*;) the Wampum Snake, (*C. fasciatus*;) the Chain Snake, (*C. gætulius*;) the Pine, or Bull Snake, (*C. melanoleucus*;) the House, or Chicken Snake, (*C. eximius*;) the Red-chicken Snake, (*C. Floridanus*;) the Corn Snake, (*C. maculatus*;) and the Bead Snake, (*C. guttatus*;) common in potatoe patches.

do so now; and Michaëlis recommended travellers to make the subject of these Serpents a matter of investigation. In conformity with these wishes, Niebuhr ("Description de l'Arabie") collected the following information:—"There is, at Bâsna, a sort of Snake called *Heie sursurie*, or *Heie thiâre*. These Snakes commonly keep upon the date trees; and, as it would be laborious for them to come down from a very high tree, in order to ascend another, they twist themselves by the tail to a branch, and impelled by the motion they give it, they launch themselves to the next tree. Hence it is, that the modern Arabs call them flying Serpents, *Heie thiâre*."

"In the island of Quibo, near Panama," says Lord Anson, "the Spaniards informed us, that there was often found in the woods a most mischievous Serpent, called the *flying Snake*, which, they said, darted itself from the boughs of trees on either man or beast that came within its reach, and whose sting they believed to be inevitable death." It is, then, from their rapidity, and their powers of darting from branch to branch, that these Snakes have acquired the epithet "flying."

#### GENUS DIPASAS.

In *Dipsas* the head is large and blunt; the body long, slender, and compressed on the sides; and a row of scales, larger than the rest, runs along the spine. The BULL-HEADED SNAKE of India, (*D. Indica*, Cuv.; *Columber bucephalus*, Shaw,) is an example. This slender Reptile is about four, or four and a half feet long. It is said to be extremely active.

#### GENUS DENDROPHIS:

In the genus *Dendrophis*, the head does not exceed the circumference of the body; the latter is extremely long and slender; the scales down the spine are large; those along the sides narrow, and appearing as if placed in oblique lines.

The BOIGA, (*D. ehatulla*, Fitz.; *C. decorus*, Shaw,) is an example. (See engraving.) This species, which



BOIGA.

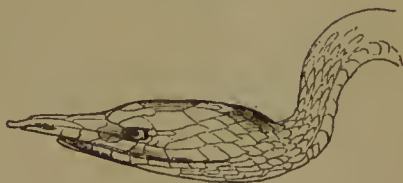


is a native of Borneo, is adorned with rich and well contrasted colouring, which glitters with metallic lustre, reminding us of the splendid hues of the humming bird; and its movements are distinguished for rapidity and elegance. It is upwards of three feet in length, but of extreme slenderness, and its tail, which is long, narrows to a fine point. The Boiga, says Latreille, darts with the rapidity of an arrow, throws itself instantaneously into folds, twines round any object, climbs trees with the greatest facility, and there hangs, or balances itself, the golden azure of its scales glittering in the eyes of the astonished spectator. Thus prepossessing in appearance, its disposition is in harmony with its outward beauty; it is so gentle, that the children in Borneo play with it, carry it in their hands, and suffer it to twine itself round their limbs or bodies. The upper part of the body is blue, with a metallic lustre, passing into emerald green; a rich golden stripe runs down the spine, and one along each side; the under parts are blue; a white streak runs along the upper jaw, and near it one of black.

This Snake feeds on insects, small birds, nestlings, and eggs.

#### GENUS DRYINUS.

The genus *Dryinus* resembles the *Dendrophis*, excepting that a slender, snoutlike appendage projects from the muzzle, which is moveable, as in the



annexed sketch. The *DRYINUS NASUTUS* (*Coluber nasutus*, Russell) is an example.

#### GENUS DRYOPHIS.

In *Dryophis* the body is extremely slender, but the scales are all equal, and the muzzle is simply pointed. An American snake, (*D. æneus*, Spix,) is an example

We may here observe, that the Greeks called Serpents, distinguished for celerity of motion, *Acontias*,\* (javelin Snakes,) and the Romans, *Jaculus*, which has the same meaning. Lucan terms these Snakes *Jaculi volucres* (flying javelin Snakes.) The term *Acontias* is applied by modern naturalists to a very different group of Reptiles, (See page 192.)

Dr. Smith, in his "Zoology of South Africa," figures, most admirably, and describes a tree Snake of that country, under the name of BOOMSLANGÈ, (*Bucephalus Capensis*,) separating it from the genus *Dryophis*, to which it is allied. This Snake, is regarded by the Hottentots as poisonous, yet erroneously; it has no poison fangs, but the posterior teeth are somewhat like fangs, in order to enable the Reptile to seize birds with more security. This Snake is subject to great variety of colouring; some are very beautifully variegated with olive, or yellow; some with pale brown, pink, and yellow; some are plainly brown. The eyes are large and full. (See engraving.)

"The Boomslange," says Dr. Smith, "is generally found upon trees, to which it resorts for the purpose of catching birds, upon which it delights to feed. The presence of a specimen in a tree, is, generally, soon discovered by the birds of the neighbourhood, which collect around it, and fly to and fro, uttering the most piercing cries; till one, more terror-struck than the rest, actually scans its lips, and, almost without resistance, becomes a meal for its enemy. During such a proceeding, the Snake is generally observed with its head raised about ten or twelve inches above the branch, round which its body and tail are intertwined, with its mouth open, and its neck inflated, as if anxiously endeavouring to increase the terror which, it would almost appear, it was aware would, sooner or later, bring within its grasp some one of the feathered group.

\* *Ακοντίον*, (*acontion*,) *jaculum*, a javelin, or dart.





BOOMSLANG.



“Whatever may be said in ridicule of fascination, it is, nevertheless, true, that birds, and even quadrupeds are, under certain circumstances, unable to retire from the presence of their enemies; and, what is still more extraordinary, unable to resist the propensity to advance from a situation of actual safety, into one of the most imminent danger. This I have often seen exemplified in the case of birds and Snakes; and I have heard of instances, equally curious, in which antelopes, and other quadrupeds, have been so bewildered by the sudden appearance of crocodiles, and by the grimaces and contortions they practised, as to be unable to fly, or even move, from the spot towards which the latter were approaching to seize them.” We have already noticed the subject of fascination, and explained the apparent mystery.

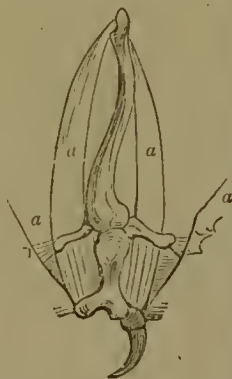
From the Colubrine group, we pass to the formidable Boas and Pythons, which form a section by themselves. These Reptiles, the giants of their race, and terrible from their vast powers, and their mode of attack, are the scourges of the forests of the intertropics.

The Latins, as it is said, gave the term Boa to Serpents of extraordinary magnitude, because they fancied that these Reptiles drained the udders of the cattle in their pastures; and, though this supposition is erroneous, the name is still retained by modern naturalists, because it is convenient and long established. It was, however, first applied by Linnæus to the huge Serpents inhabiting the hotter portions of the globe; but is now restricted to a group peculiar to the intertropical regions of America; while to the large Snakes of Africa, India, and the Indian islands, the term Python is given, as a generic title. They exhibit characteristics of their own, distinguishing them from their American relatives, with whom they agree in size, habits, powers, and ferocity.

Both the Boas and Pythons possess hook-like claws, which may be regarded as the rudiments of limbs; these are acted upon by muscles, and are placed just anterior

to the base of the tail, acting as a fulcrum, while the tail, which is strongly prehensile, is firmly twined round any object.

Though only small, hooked points, sheathed with horn, are externally visible, there is internally a series of bones, representing, very imperfectly, those of the lower limbs, (see the annexed figure, which shows the bones dissected, and the direction of the muscles, *a, a*, attached to them.) In the Boa, the head is covered with small scales to the muzzle; and the scuta of the tail are undivided. In the Python, there are plates over the anterior part of the head, and the scuta of the tail are divided.



Fancy cannot paint a more formidable, or more terrific object, than are the monstrous Serpents of the present group; nothing can be conceived, the attack of which, man or animals can less successfully combat. Let the reader imagine himself enveloped instantaneously, as if by magic, in the folds of a huge Boa, or Python. His sinewy form, thirty feet in length, twining around you, prevents your most strenuous efforts for liberation; his weight bears you to the earth; the combined energy of thousands of muscles acting on so many levers, and every lever on the strain, crushes in your chest, stifles your feeble cries, breaks your vainly struggling limbs, and reduces you to a bruised and mangled mass; and all this takes place so rapidly, so suddenly, that all hope of succour is as vain as are your despairing struggles. Should your companions hear your moans, your death is sealed ere they can bring assistance; if, indeed, panic has not deprived them of all presence of mind.

These huge Snakes act the tiger's part; they take their prey by stratagem. Hot steaming morasses, the swampy

margin of rivers, the borders of lakes, the tangled under-wood that skirts the dark and marshy forest—these are their favourite abodes. There they lurk, half floating in the water, half stretched upon the land, or partly twined around some rugged trunk, to the bark of which their colours assimilate. Patient to wait, undaunted to attack, and darting on their victim, rapid as an arrow, or the lightning's flash, what can escape? They throw their bodies into folds, or knots, around that of their prey, so instantaneously, that the eye can scarcely follow the action; and so great is their strength, that the bones of the ox snap beneath their efforts. Having crushed their prey into a shapeless mass, they slowly untwine their tortuous length, raise their head aloft, the tongue rapidly vibrating, and the jaws reeking with glutinous saliva, and prepare to engulf their prey. The work proceeds slowly, and with many efforts; and when the whole is swallowed, the distended Snake sinks into a state of lethargic stupor.

In this torpid condition, the Boa or the Python is defenceless, and may be easily killed; and the natives profit by the occasion to destroy them. The negroes are said to esteem the flesh as a delicacy.

Many of our readers are acquainted with the circumstances, recorded in history, relative to a huge Serpent, against the force of which, Regulus was obliged to employ the most effective military engines then known. This monster is said to have occupied a certain situation on the banks of the river Begerada, between Utica and Carthage, and to have destroyed many soldiers, who had gone to the spot for the purpose of procuring water. Darts hurled at him, glanced off his scales; so that the machines for throwing large stones were obliged to be brought up: at length, a ponderous stone struck him on the back, and laid him prostrate on the earth. Regulus took the skin to Rome, and it is said to have measured a hundred and twenty-three feet; but we

cannot help thinking this a great exaggeration, if the measurement be what we suppose.

Diodorus Siculus relates, that in Egypt, under the Ptolemies, an enormous Serpent, thirty cubits long, was taken alive, though not without the greatest difficulty. The animal was in the habit of couching, very much at his ease, on the margin of the water; there, folded in a circle, and quite motionless, but with the head just raised, so that he could discern the approach of any quadruped, which might come to quench its thirst, he waited in expectation of his victim. Stimulated by the hope of gain, some hunters resolved to seize him alive, and carry him to Alexandria. Two perished in the first attack: still the courage of the men was unabated, and they planned to block up the entrance to the cave, to which the animal was accustomed to retire, and to place near this haunt a net composed of cordage, duly proportioned to the creature's strength. Into this snare he fell, being frightened by the men, who presented themselves suddenly in a body, advancing towards him with their weapons, and making a noise with loud, clashing instruments. After useless efforts to break his bonds, he was taken to Alexandria."

These accounts, though perhaps exaggerated in the details, serve to show the acquaintance of the ancients with these giants of the Snake tribe; and sufficiently demonstrate the terror which their powers universally inspired. Nor are the details given by modern travellers, much calculated to diminish the impression.

The Boas, properly so called, are natives of the hotter portions of South America; and several distinct species are known. Of these, may be mentioned the Boa Constrictor, the Anaconda, or Boa Scytale, the Aboma, or Boa Cenchrus, the Bojubi, or Boa Canina, and the Broidered Boa, Boa Hortulana.

The BOA CONSTRICTOR is remarkable for the beauty of



its markings; a broad chain, consisting alternately of large blackish and somewhat hexagonal marks, and of pale, oval dashes, extends along the back, forming a very elegant design. The Aboma is equally beautiful, but differently marked.

It is to the Boa Constrictor that the epithets "king," "emperor," "divine," as indicating its superiority over all other Reptiles, have been given; but they apply equally to the other species; all of which appear to have been regarded with religious veneration. Our account of the Boa, therefore, is rather general, than limited to one particular species.

These gigantic Snakes frequent the marshes, and luxuriant margins of the rivers, and fresh-water lakes of intertropical America, and reign the terror of man and beast. The swiftness of the deer is no protection; the monkey is not safe among the branches; nor the large fish in the water. To climb, to swim, to dart along the ground, are the endowments of these powerful Reptiles, and they avail themselves of each in turn.

It was from the display of such varied powers, combined with a nature daring, ferocious, and blood-thirsty, that the ancient Mexicans regarded the Boa with religious veneration. The supreme divinity of that remarkable nation was represented with a Snake in his right hand, or coiled round him, and his altar. To this image they offered bloody and inhuman sacrifices.

"On a blue throne, with four huge silver snakes,  
As if the keepers of the sanctuary,  
Circled with stretching neck, and fangs displayed,  
Mexitli sate: another graven snake  
Belted with scales of gold his monster bulk."—SOUTHEY.

"This great power, this indomitable force, its gigantic length, the lustre of its scales, the beauty of its colours, have inspired," says M. Lacépède, in reference to the Boa, "a sort of admiration, mingled with affright, in the minds of most people in a savage condition; and, as all that

produces terror and admiration, every creature that appears to be endowed with a great superiority over other beings, hardly fails to create in minds little enlightened the idea of a supernatural agent, it was not without religious fear that the ancient inhabitants of Mexico regarded this Serpent. Whether they supposed that an enormous mass, executing movements so rapid, could not be stirred but by a divine inspiration, or that they only regarded the animal as a minister of the omnipotence of the God of heaven, it became the object of their worship. They gave it the title of 'emperor,' in order to designate the pre-eminence of its endowments; and, having adopted it as the object of their adoration, they devoted to it their particular attention. None of its movements, speaking in a general sense, escaped them; none of its actions were to them matters of indifference. As its protracted hiss caught their ear, they listened with religious trembling, for they deemed that these sounds, these signs of the various passions, or feelings of a being, which they regarded as supernatural and divine, must be connected with their destiny.

"It has happened, that these hissings have been much stronger, and more frequent on the approach of violent tempests, pestilential diseases, cruel wars, or other public calamities. Indeed, it is frequently the case, that epidemic maladies are often preceded by a violent heat, an extreme dryness, a particular state of the atmosphere, a highly electrical condition of the air, by which the Snakes would be greatly excited, and led to utter hissings louder than usual: however this may be, the hissings of the Boa, the 'divine Boa,' were regarded as forewarnings of impending evils, and listened to with the utmost consternation."

A fearful picture of the blind and impious adoration paid to the ferocious Boa, often tamed by the priests, for the purpose of overawing the multitude, is finely drawn by Southey, in his poem of "Madoc."

“Forth from the dark recesses of the cave  
The serpent came: the Hoamen at the sight  
Shouted; and they who held the priest, appall’d  
Relax’d their hold. On came the mighty snake,  
And twin’d in many a wreath round Neolin,  
Darting aright, aleft, his sinuous neck,  
With searching eye, and lifted jaw, and tongue  
Quivering, and hiss as of a heavy shower  
Upon the summer woods. The Britons stood  
Astounded at the powerful reptile’s bulk—  
And that strange sight. His girth was as of man,  
But easily could he have overtopp’d  
Goliath’s helmed head, or that huge king  
Of Basan, hugest of the Anakim:  
What, then, was human strength, if once involved  
Within those dreadful coils! The multitude  
Fell prone and worshipp’d.”

Stedman, in his expedition to Surinam, had an adventure with one of these Boas, which shows their vast power and activity. On leaving his boat, he had scarcely proceeded above twenty yards through mud and water, when he discovered a huge Snake rolled up under the fallen leaves and rubbish of the trees, and so well was the animal covered, that it was some time before he distinctly perceived the head of the monster, which was distant from him only about sixteen feet. It was rapidly vibrating its forked tongue, and its eyes, from their uncommon brightness, glittered like sparks of fire. He raised his gun, and fired; but missing the head, the ball went through the body. In a moment the animal struck round, lashing the ground with such force as to cut away all the underwood, as if with a scythe, while the mud and dirt flew in all directions. Following up the attack, Stedman, who at first retreated, now ventured on, and found the Snake at a short distance from the former station, quietly lying among fallen leaves, rotten boughs and moss, which concealed all but the head. He fired again; the animal was again wounded, and violently flounced about, throwing a shower of mud and dirt around. At the third fire, the animal was shot through the head, and soon expired. The length of this Snake, which the negroes declared to be young, was

upwards of twenty-two feet ; and its thickness that of a boy about twelve years old.

The Pythons are natives of India and its islands, and of Africa. One species of great size, and beautifully marked, the TIGER PYTHON, (*Python tigris*,) is not unfrequently brought alive to England : it is a native of India and Java. It is as large as the largest Boa, but more slender ; and is greatly to be feared. Stories are told of the tiger falling a prey to this formidable Reptile, and of buffaloes being crushed in its strenuous folds. To the powers of these Serpents we have previously alluded. A Serpent of this species was brought from Batavia, in the year 1817, on board a vessel, which conveyed Lord Amherst and his suite to England.

This Serpent was of large dimensions, though by no means one of the largest of its kind ; it was, however, very lively ; and some parties on board determined, from curiosity to see the manner in which the Reptile takes its prey, to subject it to an experiment. A goat was introduced into the spacious cage, in which the Snake was kept. In a moment, the Snake reared its head, gazed at its victim for a few seconds, and touched it with its tongue ; it then withdrew its head, and darted at the throat. The poor goat, aware of its perilous situation, and driven to act on the defensive, displayed a courage worthy of a better fate : when the Snake darted at its throat, it received the Reptile on its horns. The Snake drew back, but only to take another and more certain aim ; and, in an instant, it seized the goat by the leg, and threw the animal violently down. With astonishing velocity, like a flash which dazzles and is gone, the Snake encircled the victim in his coils ; the neck in particular, being heavily and rigidly embraced. So overpowered was the goat, that it could not even struggle for escape ; and life was soon crushed out. For some minutes after its prey was dead, the Serpent still continued its pressure, and held the goat in its folds. At

length, it gradually slackened its grasp, and having entirely disengaged itself, it prepared to swallow the lifeless body. Feeling about it with its mouth, it began to draw the head into its throat; but the horns, which were four inches long, rendered the gorging of the head a difficult task. Gradually they passed in, their course being quite apparent, as they were forced along the gullet into the stomach, by the prominences they occasioned, their points appearing as if about to protrude through the skin. In about two hours, the whole body of the goat was engulfed. During the whole of this performance, which required great exertion, the appearance of the Serpent was hideous; it looked as if suffering strangulation; the cheeks were swelled out as if bursting, the jaws were dripping with saliva, and the horns of the goat seemed about to rupture the skin, stretched to its utmost state of tension. The Boa now measured double his ordinary diameter: it passed directly into a lethargic condition, from which no irritation could rouse it, and continued so for several days.

The Pythons in the Zoological Gardens, are fed with rabbits, which they destroy by winding round and crushing them; they are then easily swallowed: the expansive power of the jaws permitting a very small specimen to manage such animals.\*

In the "Oriental Annual," is the following narrative, accompanied by an engraving, from a picture by Mr.

\* A singular occurrence, in March, 1841, at the Zoological Gardens, may here be noticed. A large Python, in a well-secured cage, containing others, and of these, one nine feet long, was fed one evening with three guinea pigs and a rabbit. The next morning, on looking into the cage, the Python nine feet long was missing: it could not have escaped; what then had become of it? The truth was evident: the large Python (not much larger than itself) had swallowed it. How it was done, no one could tell, as it must have happened during the night; but there the monster lay, torpid, and bloated to double his ordinary dimensions. One may suppose a fearful struggle to have ensued, ere the victim was engulfed; perhaps, however, it was itself torpid, and incapable of resistance. Be this as it may, such is the fact.

W. Daniell, showing that men are by no means exempt from the attacks of these gigantic Serpents.

“A few years before our visit to Calcutta,” says the writer, “the captain of a country ship, while passing the Sunderbunds, sent a boat into one of the creeks, to obtain some fresh fruits, which are cultivated by the few miserable inhabitants of this inhospitable region. Having reached the shore, the crew moored the boat under a bank, and left one of their party to take care of her. During their absence, the lascar who remained in charge of the boat, overcome by heat, lay down under the seats, and fell asleep. Whilst he was in this happy state of unconsciousness, an enormous Boa Constrictor (Python) emerged from the jungle, reached the boat, and had already coiled its huge body round the sleeper, and was in the very act of crushing him to death, when his companions fortunately returned at this auspicious moment, and, attacking the monster, severed a portion of its tail, which so disabled it, that it no longer retained the power of doing mischief. The Snake was then easily despatched, and found to measure, as stated, sixty-two feet and some inches in length.”

This account, though probably founded on fact, must be taken with allowance: if the Snake had absolutely twined round the man, his destruction must have been inevitable; and the length given of sixty-two feet, is somewhat startling. The Snake, most likely, was met making his way to the boat, or just about to invade it.

Pythons of enormous size exist in Africa. Ludolph states, that such Snakes exist in Ethiopia; and Bosman informs us, that entire men have been found in the gullets of Serpents, on the Gold Coast.

Dr. Smith figures and describes a Python, under the name of PYTHON NATALENSIS, which, among others, he met with in Southern Africa. “This Snake,” he observes, “or at least one resembling it, was formerly an inhabitant of the districts now within the Cape colony:



and the traditions of the older Hottentots abound with instances of its miraculous powers. At present, it is not to be found within a hundred miles of the boundaries of the Cape colony; and few specimens have been observed nearer than Port Natal. It occasionally attains to a very large size; and, according to the natives, individuals have been seen, whose circumference was equal to that of a stout man. We have ourselves seen a skin, which measured twenty-five feet, though a portion of the tail part was deficient.

“It feeds upon quadrupeds; and, for some days after swallowing its food, remains in a torpid state, and may be then easily destroyed. The South Africans, however, seldom avail themselves of ridding themselves of a Reptile they view with the utmost horror, as they believe that it has a certain influence over their destinies, and affirm that no person has ever been known to maltreat it, without sooner or later paying for his temerity.”

We learn, from the same authority, that the Indian Python is also found in Africa; there being examples from Western Africa, in the museum at Fort Pitt, Chatham.

The superstitious respect, not unmingled with dread, which the South Africans entertain towards the Python, was once (perhaps, still is) carried to a greater extent in Whidah, in Guinea. There it had its priests, its temples, its victims, and its offerings; delicate meats, sheep, and various kinds of valuables were devoted to it; or rather to the impious priests, who, proclaiming and maintaining it as a god, enriched themselves at the expense of an ignorant and besotted multitude, and luxuriated on their credulity. But the dawn of a brighter day for Africa is at hand, nay, has already begun; and the beams of the bright gospel of truth will scare to their gloomy retreats, the Serpent idols, which the negro once venerated; and render the fetishes, once his foolish dependence, the objects of his ridicule and abhorrence.

It was, probably, to large Serpents, or Pythons, that the Hebrews referred under the name *tan*, or *tannin*, translated dragon in the English Bible; the word, however, is involved in some obscurity, and is, apparently, employed by the sacred writers, with great latitude.

We shall now pass to the poisonous or venomous section of Snakes, which are even more to be dreaded than the largest of the Boas or Pythons.

### VENOMOUS SNAKES.

All, as far as is known, are ovoviviporous, that is, producing living young from eggs hatched while yet in the body of the mother. Venomous Snakes form several distinct groups, or families, as the *Naja* group, the *Viperine* group, and the *Crotaline*, or *Rattlesnake* group.

#### GENUS NAJA.

The genus *Naja*, which contains the hooded Serpents, termed COBRA DA CAPELLO, is characterized by the head being covered with large plates, and by the skin of the back of the neck being dilatable, or capable of such expansion as to form a sort of hood, impressed with a mark somewhat like a pair of spectacles. Their bite is deadly in the extreme. They attain to considerable dimensions, often exceeding six feet in length. When irritated, these Snakes rise on their tail, or the posterior portion of their body, elevate their head, expand their hood, the scales being forced to a great distance asunder, hiss loudly, and by their actions, and the bright glance of their eye, evince boldness and resolution: they then look very beautiful, and were no danger connected with their threatening, might be contemplated with pleasure. They will, however, not only attack, but repeat their attack, pursue their assailant with great fury, and spring upon him with wonderful velocity.

Several species are known; of these some are Indian, as the *Naja tripudians*, *Naja larvata*, etc.; others

are African, as the *Naja haje*. In habits they all agree. It was to the *Naja tripudians* that the Portuguese originally gave the name of Cobra da Capello; but it is now applied to all, and may be used as a general title.

With respect to the Haje, or Egyptian Cobra, Cuvier observes, that "its habit of elevating itself, when approached, led the ancient Egyptians to believe that it was the guardian of the plains which it inhabited, and they adopted it as the protecting deity of the world; it is this Snake which they sculptured on the portals of all their temples, on two sides of a globe. This species is incontestably that which the ancients have described under the title of the Asp, or Aspic, of Egypt, or of Cleopatra."

The Asp, or *Pethen* of the Hebrews, is most probably this Snake; and allusions are frequent in the Scriptures to its poison, and to its fierce and deadly nature. In allusion to the heathen, Moses writes, "Their wine is the poison of dragons, and the cruel venom of asps," Deut. xxxii. 33. Zophar, showing the state of the wicked, says, "His meat is the gall of asps within him," Job xx. 14. Isaiah describing the glorious reign of peace and truth, which the promised Messiah will establish, that "Rod out of the stem of Jesse," upon whom the "Spirit of the Lord shall rest," pictures scenes of harmony and delight, in language of surpassing elegance and richness of imagery. One of his figures is in allusion to this Reptile—the type of danger and destruction: "And the sucking child shall play on the hole of the asp, and the weaned child shall put his hand on the cockatrice' den. They shall not hurt nor destroy in all my holy mountain," Isa. xi. 8, 9. St. Paul, quoting what is written respecting the wicked, says, "The poison of asps is under their lips," Rom. iii. 13; a most powerful and characteristic expression.

But the Scriptures make other allusions to this Snake, which will lead us to a curious circumstance in its history

Jeremiah writes, "For, behold, I will send serpents, cockatrices, among you, which will not be charmed, and they shall bite you, saith the Lord," Jer. viii. 17. "Their poison is like the poison of a serpent: they are like the deaf adder that stoppeth her ear; which will not hearken to the voice of charmers, charming never so wisely," Psa. lviii. 4, 5.

The charming or incantation of Serpents is so singular, that many have denied the fact altogether; and some have asserted that it is an imposture, or deception; tame Snakes, previously instructed, being always exhibited. We believe it to be a fact, that Serpents can be charmed; in other words, we believe them to be susceptible, in the extreme, of impressions from musical notes, and peculiarly modulated sounds, under which they writhe their bodies from the sensations of pleasure which they experience; while, to these movements, the charmers know how to adapt the *time* of their simple strain, or succession of notes.

The ancients were acquainted with this fact. Hence, Orpheus is said to have silenced, by his music, the hissings of the snake-headed Cerberus.

"Cerberus Orpheo lenivit sibila cantu."—LUCAN.

He knew how to still the hissing of the Serpent when approaching, and render the Snake harmless.

Pliny and Seneca both assert, that Serpents can be drawn from their lurking places by the power of music. Modern travellers and writers have alluded to the same facts, or to the influence of music on these Reptiles. Chardin, Greaves, Shaw, Bruce, and others, might here be cited. Chateaubriant, ("Beauties of Christianity,") affirms the same with respect to the Rattlesnake of America. According to his account, a Snake of this species once entered the encampment of his party in Canada. A Canadian, who could play the flute, advanced, by way of diversion, with this magic instrument, against the Reptile. "On the approach of its enemy,"

the haughty Reptile curled itself into a spiral line, flattened its head, inflated its cheeks, contracted its lips, displayed its envenomed fangs, and its bloody throat; its double-tongue glowed like two flames of fire; its eyes were burning coals; its body, swollen with rage, rose and fell like the bellows of a forge; its dilated skin assumed a dull and scaly appearance; and its rattle, which sounded the denunciation of death, vibrated with extreme velocity. The Canadian now began to play upon his flute: the Serpent started with surprise, and drew back its head. In proportion as it was struck with the magic effect, its eyes lost their fierceness, the vibrations of its tail became slower, and the sound which it emitted gradually became weaker and ceased. The folds of the fascinated Serpent, became less perpendicular upon their spiral line, expanded by degrees, and sunk one after another upon the ground, forming concentric circles. The colours recovered their brilliancy on its quivering skin; and slightly turning its head, it remained motionless in the attitude of attention and pleasure. At this moment, the Canadian advanced a few steps, producing with his flute sweet and simple notes. The Reptile inclining its variegated neck, opened a passage with its head through the high grass, and began to creep after the musician, stopping when he stopped, and following him again as soon as he moved forward." In this manner, to the astonishment both of Europeans and natives, he was led out of the camp; and it was unanimously decreed, that the life of a creature, so sensible of "the concord of sweet sounds," should be spared.

The Serpents upon which the charmers in Egypt and India exercise their art, are chiefly Cobras; perhaps, because these Reptiles, from their size, and the deadliness of their venom, offer the most convincing and surprising proofs of their skill. These men are, generally, of a separate and distinct caste, or tribe, and arrogant, as might be expected, more credit for their powers than



they really are entitled to. They throw an air of mystery over their operations, which has led many to give them no credit at all. Mr. Johnson, for example, in his sketches of "India Field Sports," says, "The professed snake-catchers in India, are a low caste of Hindoos, wonderfully clever in catching Snakes, as well as in practising the art of legerdemain: they pretend to draw them from their holes by a song, and by an instrument somewhat resembling an Irish bagpipe, on which they play a plaintive tune. The truth is, this is all done to deceive. If ever a Snake comes out of a hole at the sound of their music, you may be certain that it is a tame one, trained to it, deprived of its venomous teeth, and put there for the purpose; and this you may prove, as I have often done, by killing the Snake, and examining it, by which you will exasperate the man exceedingly."

That the snake-charmers may often act thus, no one will doubt, but it is no proof that they have not the power of drawing *wild* Snakes from their retreats. Mr. Forbes, in his "Oriental Memoirs," appears disposed to grant that they have the power in question, through the influence of music: and Dr. Shaw states, that a belief in the influence of songs, muttered incantations and sentences written on scrolls, upon venomous Snakes prevailed in Barbary wherever he travelled. That these men break the venom teeth out, by way of precaution is admitted; but yet accidents often arise, for in a little time these teeth are renewed. Mr. Johnson states, that a man exhibited a tame dancing Cobra before a large party. "A boy, about sixteen years old, was teasing the animal to make it bite him, which it actually did, and to some purpose, for in an hour afterwards he died of the bite. The father of the boy was astonished, and protested it could not be from the bite, that the Snake had no venomous teeth, and that he and the boy had often been bitten by it before, without any bad effect. On examining the Snake, it was found that the former fangs were replaced by new ones, then not far out of the jaws."



but sufficient to bite the boy. The old man said he never saw or heard of such a circumstance before."

With regard, however, to the power of music on the Cobra, the following original communication in the "Penny Magazine" is very conclusive. The writer assures us, that he received the narrative from a gentleman of high station in the Hon. East India Company's civil service, at Madras, a man of undoubted veracity. It is as follows:—  
"One morning, as I sat at breakfast, I heard a loud noise and shouting amongst my palankeen bearers. On inquiry, I found that they had seen a large hooded Snake, (Cobra da Capello,) and were trying to kill it. I immediately went out, and saw the Snake climbing up a very high green mound, whence it escaped into an old wall of an ancient fortification. The men were armed with their sticks, which they always carry in their hands, and had attempted in vain to kill the Reptile, which had eluded their pursuit: in its hole it had coiled itself up secure, whilst we could see its bright eyes shining. I had often desired to ascertain the truth of the report, as to the effect of music upon the Snakes, I therefore inquired for a snake-catcher. I was told there was no person of the kind in the village; but after a little inquiry, I heard there was one in a village distant three miles. I accordingly sent for him, keeping strict watch over the Snake, which never attempted to escape, whilst we, its enemies, were in sight. About an hour elapsed, when my messenger returned, bringing a snake-catcher. This man wore no covering on his head, nor any on his person, excepting a small piece of cloth round his loins. He had in his hands two baskets, one containing tame Snakes; one empty. These, and his musical pipe, were the only things he had with him: I made the snake-catcher leave his two baskets on the ground at some distance, while he ascended the mound with his pipe alone. He began to play; at the sound of music, the Snake came gradually and slowly out of its hole. When it was entirely within reach, the snake-catcher seized

it dexterously by the tail, and held it thus at arm's length: whilst the Snake, enraged, darted its head in all directions, but in vain: thus suspended, it has not the power to round itself, so as to seize hold of its tormentor.

"It exhausted itself in vain exertions, when the snake-catcher descended the bank, dropped it into the empty basket, and closed the lid. He then began to play, and after a short time, raised the lid of the basket; the Snake darted about wildly, and attempted to escape; the lid was shut down again quickly, the music always playing. This was repeated two or three times; and in a very short interval, the lid being raised, the Snake sat on its tail, opened its hood, and danced as quietly as the tame Snakes in the other basket, nor did it again attempt an escape. This, having witnessed with my own eyes, I can assert as a fact."\* (See engraving.)

From the earliest ages, snake-charmers have existed in the east; they were believed to possess some secret magical influence over these Reptiles, to be capable of controlling them by charms, or incantations, and even to cure persons who had unfortunately been subjected to their bite.

Among the most celebrated, were the *Psylli*, a people of *Cyrenaïca*, (a region in Africa abounding in Reptiles,) who were reported to possess a natural and inherent power over Snakes, which Pliny supposed to be dependent on some peculiar odour in their persons, which these animals abhorred. Lucan, in his "*Pharsalia*," describes the method adopted by these snake-charmers of preventing the Roman camp from becoming infested with them. They marched around it, chanting mystic sounds; but in addition to these incantations, as night drew on, they kept up fires around the encampment. By

\* Mr. Schomberg states, in reference to a lizard (*Anolius bullaris*) common in the West Indies, that "they are often caught by boys, who take advantage of their fondness for musical sounds, arresting their attention, and then throwing a little noose over their head," as they perch in a listening attitude on the branches of the trees. See Linn. Trans., vol. xvii. p. 560.



COBRA DA CAPELLO.



magic songs they also pretended to cure such of the soldiers as were bitten, first rubbing the wound with saliva; but when they perceived the symptoms of danger increase, they sucked the venom from the wound.

That these *Psylli* possessed no power beyond what the serpent-catchers of the east at present possess, need scarcely be asserted. They knew, by long experience, the habits of the Reptiles, their character, their virulence; and by practice how to manage them: but they, as well as the present "charmers," pretended to more than they really could perform, and made a profit by their juggling.

In the east, charmers, or snake-catchers, make an exhibition of their tame Serpents, the poison teeth of which are removed, and also rid houses of these Reptiles; for houses are often infested by them, especially when the walls are old, and full of crevices. In both instances, the music of a pipe, or the notes of a small drum, allure the animal from its hiding place. A learned native of India assured Sir W. Jones, that he had frequently seen the most venomous and malignant Snakes leave their holes upon hearing notes from a flute, which, as he supposed, gave them peculiar delight. In the "*Missionary Magazine*," for March, 1837, Mr. Gogerly, a missionary in India, states, that some incredulous persons, after the most careful precautions against any trick or artifice being played, sent a charmer into the garden to prove his powers. "The man began playing upon his pipe, and proceeding from one part of the garden to another for some minutes, stopped at a part of the wall much injured by age, and intimated that a Serpent was within. He then played quicker, and his notes were louder; when almost immediately a large *Cobra da Capello* put forth its hooded head; and the man fearlessly ran to the spot, seized it by the throat, and drew it forth. He then showed the poison-fangs, and beat them out; afterwards, it was taken to the room where his baskets were left, and deposited among the rest." We have here an instance, not only of the power

which these men have of drawing forth Snakes from their retreats, but of knowing where they lie hidden, and that without seeing them. Mr. Lane suspects, that they discover the presenee of Serpents by the smell; and this may be true. It may, however, be by the ear; for while others are listening to the music, the charmer may be listening for the slight rustle, the gentle noise which the Reptile roused by the notes would make, as he moved in his hole, and which would betray his presenee to the charmer's practised ear.

Besides the music of pipes, or other instruments, the Egyptian charmers also employ vocal sounds, and a form of words, in order to draw the animals forth. "The charmer," says Mr. Lane, "assumes an air of mystery, strikes the walls with a short palm stick, whistles, makes a clucking noise with his tongue, and generally says, 'I adjure you by God, if ye be above, or if ye be below, that ye come forth; I adjure you by the most great names; if ye be obedient, come forth, and if ye be disobedient, die, die, die!'" The effect produced on the Serpent is not by the adjuration, but, certainly, by the knocking, and the whistling, and the clucking sounds, which experience has led the man to know will influence the Snake; while the adjuration will produce its intended effect on the bystanders.

Serpent-charmers, when bitten, die like other men, and accidents of this kind sometimes happen. Robert mentions the case of a serpent-charmer in India, who came to a gentleman's house to exhibit tame Snakes. He was told, that a Cobra was in a cage in the house, and was asked if he could charm it. He replied in the affirmative. The Serpent was released from the cage, and, doubtless in a state of great irritation; the man began his incantations, and repeated his charms: they, however, produced no effect on the Snake; it refused to hear the voice of the charmer; it darted at him, and fastened upon his arm; he was dead before night.

With respect to the exhibition of tame Serpents



which are common in the east, Mr. Gogerly says, that “taking out (of their baskets) eight or ten different kinds, they cast them on the ground. The animals immediately make off in different directions. The sap-wullah (snake-charmer) then applies his pipe to his mouth, and sends forth a few of his peculiar notes, and all the Serpents stop as though enchanted; they then turn towards the musician, and approaching him within two feet, raise their heads from the ground, and bending backward and forward, keep time with the tune. When he ceases playing, they drop their heads, and remain quiet on the ground.” We learn from the same authority, that Bengalese of the lowest caste, who are a sort of inferior charmers, use a small drum instead of a pipe; and to show their immunity from the effects of poison, irritate the Snakes, until they become enraged, and fasten on their naked arms, which they sometimes allow to be bitten till covered with blood. We need not say that the poison-fangs have been carefully extracted. Other manœuvres with Snakes, such as letting them entwine about the body, and wind their folds around the arms and neck of the charmer, are also practised; and some, with unwarrantable boldness, tease the Snakes coiled around them, till the irritated animals inflict upon them severe, though not poisoned wounds; which, however, often swell and inflame dreadfully. Such is the accursed thirst for gold, the “auri sacra fames,” which makes men risk without excuse, nay, presumptuously risk their lives for a paltry gain.

In the practices of the modern serpent-charmers of the east, we perceive the force and propriety of the allusions, in the Holy Scriptures; and from which we learn, both that Snakes were anciently objects of peculiar dread, and that men then practised the same arts of charming them, as in the present day.

It is not often that any of the Cobras are brought alive to England; we have, however, seen a beautiful specimen of the *Naja larvata* of India, in the gardens of

the Zoological Society, London. It is kept in an artificial temperature of  $62^{\circ}$  Fahr.; and is fed on frogs, etc. It will drink milk greedily, and appears to be in full vigour.

We shall conclude our sketch of the Cobra, with the following narrative of an adventure, which occurred to a gentleman in India, who was reposing under a tamarind tree alone, after a day's shooting. It is taken from the "Asiatic Journal."

"I was aroused by the furious baying of my dogs; on turning round, I beheld a Snake of the Cobra da Capello species, directing its course to a point that would approximate very close upon my position. In an instant I was upon my feet. The instant the Reptile became aware of my presence, in nautical phraseology, it boldly brought to, with expanded hood, eyes sparkling, neck beautifully arched, the head raised nearly two feet from the ground, and oscillating from side to side, in a manner plainly indicative of a resentful foe. I seized a short bamboo, left by one of the bearers, and hurled it at my opponent's head. I was fortunate enough to hit it beneath the eye. The Reptile immediately fell from its imposing attitude, and lay apparently lifeless.

"Without a moment's reflection, I seized it a little below the head, hauled it beneath the shelter of the tree, and very coolly sat down to examine the mouth for the poison-fangs, of which naturalists speak so much. While in the act of forcing open the mouth with a stalk, I felt the head sliding through my hand; and to my utter astonishment, became aware that I had now to contend against the most deadly of Reptiles, in its full strength and vigour. Indeed, I was in a moment convinced of it; for, as I tightened my hold of the throat its body became wreathed round my neck and arm.

"I had raised myself from a sitting posture to one knee, my right arm, to enable me to exert my strength, was extended. I must in such an attitude have appeared terrific enough to represent a deity in the Hindoo my-

thology, such as we so often see rudely emblazoned on the portals of their native temples. It now became a matter of self-defence. To retain my hold, it required my utmost strength to prevent the head from escaping, as my neck became a purchase for the animal to pull upon.

“ If the reader is aware of the universal dread in which the Cobra da Capello is held throughout India, and the almost instant death which invariably follows its bite, he will, in some degree, be able to imagine what my feelings were at that moment; a shudder, a faint kind of disgusting sickness pervaded my whole frame, as I felt the cold clammy fold of the Reptile’s body tightening round my neck. To attempt any delineation of my sensations would be absurd and futile: let it suffice, they were most horrible.

“ I had now almost resolved to resign my hold. Had I done so, this tale would never have been written; as no doubt, the head would have been brought to the extreme circumvolution to inflict its deadly wound. Even in the agony of such a moment, I could picture to myself the fierce glowing of the eyes, and the intimidating expansion of the hood, ere it fastened its venomous and fatal hold upon my face or neck.

“ To hold it much longer would be impossible; immediately beneath my grasp, there was an inward working and creeping of the skin, which seemed to be assisted by the very firmness with which I held it: my hand was gloved.

“ Finding, in defiance of all my efforts, that my hand was, each instant, forced closer to my face, I was anxiously considering how to act in this horrible dilemma, when an idea struck me, that if it was in my power to transfix the mouth with some sharp instrument, it would prevent the Reptile from using its fangs, should it escape my hold of it.

“ My gun lay at my feet; the ramrod appeared the very thing required, which, with some difficulty, I

succeeded in drawing out; having only one hand disengaged.

“ My right arm was now trembling from over exertion, my hold becoming less firm, when I happily succeeded in passing the rod through the lower jaw up to its centre. It was not without considerable hesitation, that I suddenly let go my hold of the throat, and seized the rod in both hands; at the same time, bringing them over my head with a sudden jirk, I disengaged the fold from my neck, which had latterly become almost tight enough to produce strangulation.

“ There was, then, little difficulty in freeing my right arm, and ultimately throwing the Reptile from me to the earth, where it continued to twist and writhe itself into a thousand contortions of rage and agony.

“ To run to a neighbouring stream, to lave my neck, hands, and face in its cooling waters, was my first act after despatching my formidable enemy.”

The effects following the bite of this Snake are faintness, agitation, tremblings, difficulty of breathing, convulsions, paralysis of the limbs, stupor, and death. Various specifics have been recommended and tried, but none are to be depended upon; and it is seldom that a man or animal bitten survives, unless, indeed, the venom-sac was previously exhausted.

#### GENUS HAMADRYAS.

Closely allied to the Cobras of the genus *Naja* is a newly described Serpent from Bengal, termed by the natives of Hindostan, *Sunkr-choar*. It is the only known representative of the genus *Hamadryas*, founded by Dr. Cantor upon the Snake in question. As the naturalist's observations are full of interest and information, we shall quote them from the “ Proceedings of the Zoological Society for 1838.”

“ This venomous Serpent is the type of a new genus, which, from its inhabiting hollow trees, and frequenting the branches, I propose to call *Hamadryas*. Its

characters induce me to assign it a place between the genera *Naja* and *Bungarus*; which two forms it will be found to connect together. As in the *Naja*, the neck is dilatable; the head is broad; the cheeks tumid; the eyes are large and prominent; the body is thick; the tail short. Behind the poison-fangs is a row of ordinary teeth.

“The *Hamadryas*, like the *Bungarus*, *Hydrus*, and *Hydrophis*, has a few maxillary teeth behind the poison-fangs, and thus, like the latter, connects the venomous Serpents, with isolated poison-fangs, to the harmless, which possess a complete row of maxillary teeth.

“Of the terrestrial venomous Serpents, the *Bungarus* is chiefly characterized by a distribution of the teeth similar to that of the *Hamadryas*, which, also, partaking of the chief characteristic of the genus *Naja*, namely, that of forming a hood or disc, constitutes an immediate link between the genera *Bungarus* and *Naja*.

“In consequence of the strong resemblance in the general appearance between the *Naja* and the *Hamadryas*, when first my attention became attracted to the latter, I thought I could refer this Serpent to that genus; and it was not until I was able to examine a specimen whose poison-fangs were untouched, (those of the first specimens I saw having been drawn by the natives, who are greatly afraid of this Serpent,) that I discovered the maxillary teeth behind the poison-fangs.” Dr. Cantor terms the species *HAMADRYAS OPHIOPHAGUS*.

“According to the natives, the *Hamadryas* feeds chiefly upon other Serpents. In one I dissected, I found the remains of a good-sized Monitor Lizard, which fact may account for its arboreal habits, as I have observed in Bengal, along the banks of the rivers, numbers of those large Lizards, among the branches of trees, watching for birds.

“The power of abstaining from food, generally speaking, so characteristic of the Serpents, is but in a

comparatively small degree possessed by this species. The most protracted starvation amounts to about a period of one month, while the *Vipera elegans*, and the *Naja tripudians*, and the *Bungarus annularis*, have, without inconvenience, been confined in cages without any food for more than ten months.

“ Two specimens of the Hamadryas in my possession, were regularly fed by giving them a Serpent, no matter whether venomous or not, every fortnight. As soon as this food is brought near, the Serpent begins to hiss loudly, and expanding the hood, rises two or three feet; and, retaining this attitude as if to take a sure aim, watching the movements of the prey, darts upon it in the same manner as the *Naja tripudians* does. When the victim is killed by poison,\* and by degrees swallowed, the act is followed by a lethargic state, lasting for about twelve hours.

“ Such of the other Indian venomous Serpents, the habits of which I have had an opportunity to study from life, show themselves much inclined to avoid other Serpents, however ready they are to attack men or animals, when provoked or driven by hunger; and I am not aware of any other of these Serpents being recorded as preying upon its own kind. A short time ago, however, during my sojourn at the Cape of Good Hope, I received from high authority the following fact, which throws a light upon the habits of the *Naja* of southern Africa, one of which, when being captured, threw up the body of a *Vipera arietans*, (*V. brachyurus*, Cuvier,) which bore marks of having been submitted to the process of digestion.†

\* It appears that one venomous Serpent can kill another by the bite: it is, however, a question whether one venomous Snake can thus kill an individual of the same species; or itself, if it accidentally inflicts a wound on its own body. Russell says, that Cobras bite each other without any consequence ascribable to the poison; but they kill other Snakes.

† “ Serpents prey upon each other; and one of a highly venomous character, swallows another equally so, though of a different variety,



“The Hamadryas, like the greater number of Indian Serpents, evinces a great partiality to water; with the exception of the tree Serpents, (*Leptophina*, Bell,) they all not only drink, but also moisten the tongue, which, as this organ is not situated immediately in the cavity of the mouth, become in the Serpents two different acts.\* Specimens of this Serpent, in my possession, changed the skin every third or four month, a process which takes place in all the Indian Serpents several times during the year. The Hamadryas is very fierce, and is always ready not only to attack, but to pursue when opposed; while the Cophias, the Vipera, the Naja, and the Bungarus, merely defend themselves; which done, they always retreat, provided no further provocation is offered. The natives of India assert, that individuals are found upwards of twelve feet in length, a statement probably not exaggerated, as I have myself seen specimens from eight to ten feet in length, and from six to eight inches in circumference. I have often heard it asserted, that Cobras (which name is naturally enough given to every hooded Serpent,) have been met with of an enormous size, but I strongly doubt their belonging to the genus Naja: among a considerable number which have come under my observation, I never saw any exceeding five to six feet in length, while the common size is about four feet. Some time before I discovered the Hamadryas,

and yet suffers nothing from the effects of the poison, thus taken into the stomach, which would have been fatal, had the smallest portion of it been inserted into the wounded skin. A Rattlesnake will seize the Moccasin Snake, and has been repeatedly seen to do it, and entirely swallow it; and yet the latter is dreadfully poisonous.”—Scientific Traets, quoted in Visitor for 1838, p. 72.

\* M. Schlegel is of opinion that serpents never drink. (*Essay sur la Physiogn. des Serpens, Partie Generale.*) “As mentioned above,” says Dr. Cantor, “I have had opportunities of ascertaining, that the greater number of Indian Serpents are very fond of water; a fact which I am aware has also been observed in the African Serpents by the eminent naturalist, Dr. A. Smith, whose valuable discoveries, which he is at present engaged in publishing, will bring to light many facts, of which we are at present in almost total ignorance, concerning the habits of animals, particularly those of the Reptiles.”

I was favoured by J. W. Grant, Esq. of the Hon. Company's civil service, with an interesting description of a gigantic hooded Serpent he had observed in the upper provinces, and which, he remarked, was not a Naja. By inspection this gentleman denied the Hamadryas to be identical with the above-mentioned.

"The natives describe another hooded Serpent, which is said to attain a much larger size than the Hamadryas, and which, to conclude from the vernacular name, *Mony-choar*, is, perhaps, another nearly allied species.

"The fresh poison of the Hamadryas is a pellucid, tasteless fluid, in consistence like a thin solution of gum arabic in water; it reddens slightly litmus paper,\* which is also the case with the fresh poison of the *Cophias viridis*, *Vipera elegans*, *Naja tripudians*, *Bungarus annularis*, and *Bungarus cæruleus*: when kept for some time it acts much stronger upon litmus, but after being kept it loses considerably, if not entirely, its deleterious effects.

"From a series of experiments upon living animals, the effects of this poison come nearest to those produced by that of the *Naja tripudians*, although it appears to act less quickly. The shortest period within which this poison proved fatal to a fowl, was fourteen minutes whilst a dog expired in two hours eighteen minutes after being bitten. It should, however, be observed, that the experiments were made during the cold season of the year."

A specimen of the present genus, Hamadryas, is in the

\* "M. Schlegel asserts, the venom is '*ni alcalin, ni acide*,' neither alkaline, nor acid. The only way in which I can account for this mistake from a man who ranks among the first erpetologists, is by supposing that M. Schlegel himself never had an opportunity of testing the poison of a living Serpent; for besides the five above-mentioned genera of Indian venomous Serpents, I found the fresh poison of different species of marine Serpents (*Hydrus*) to possess the property of turning litmus paper red. The same fact with the Rattlesnake (*Crotalus*) is noticed by Dr. Harlan, who says, 'The poison of the living *Crotalus*, tested in numerous instances with litmus paper, etc. invariably displayed acid properties'" (Vide Harlan, "Medical and Physical Researches" p. 501 sq.)



BANDED BUNGARUS.



collection of the Zoological Society, which was presented to the museum by Sir Stamford Raffles.

#### GENUS BUNGARUS.

We have already alluded to the genus *Bungarus*. This genus contains several dangerous Snakes peculiar to India, and allied to the genus *Hamadryas*; but the skin of the neck is not capable of being expanded into a hood. The scales along the middle of the back are larger than the others, as in *Dipsas*.

The BANDED BUNGARUS, (*B. fasciatus*), is one of the best known and most formidable, attaining to the length of eight feet. Besides this, we may mention the *B. cæruleus*, and the *B. lividus*. We give a sketch of the Banded Bungarus.

#### GENUS PELIAS.

Of the viperine section we may first notice the genus *Pelias*, Merrem, which contains the Common Viper of our island, and the adjacent parts of the continent. The characters of this genus are as follow:—Head depressed and wide at the posterior part, and is there covered on the top with small scales, not plates; there is no pit behind the nostrils, as in some allied genera. The scuta of the tail are divided.

The COMMON VIPER (*P. berus*) is, fortunately for us, the only British venomous Reptile; and its venom in our country, at least, is not so virulent, by any means, as that of the Serpent scourges of the hotter regions of the globe. It seldom happens that death follows its bite, in the case of human beings; we have several times seen persons whom it has wounded, and the effects have been distressing; the arm has swollen and inflamed, and a sense of faintness has followed; but, in a few days, the bad symptoms have disappeared. Ammonia, or hartshorn, given internally, and fomentations applied to the part, to be gently rubbed afterwards with oil, are the remedies usually employed. That the bite of this Reptile may prove fatal to persons labouring under

general debility, or to children of weak and irritable constitution, especially if the animal be in full energy, during the heat of summer, is not denied: such cases are, however, rare. In Spain and Italy, the venom of the Viper is more virulent than in our northern climate. In England, however, birds and small quadrupeds usually die, when bitten by the Viper, in eight or ten minutes. The Viper frequents dry sandy heaths, and commons, covered with furze and brambles; and, in many districts, is extremely abundant. Unlike the common Ringed Snake, it does not seek the water; nor does it, when put into water, swim with the ease and vigour of that Reptile. On the land, its actions are less prompt and rapid; and it is more easily captured.

In captivity, the Viper becomes dull, and will seldom take food; at least those which we have known, under such circumstances, never eat; and this is the case with most Snakes; their energies seem as if subdued by confinement. During the winter the Viper remains torpid in its retreat; several tenanted the same place of concealment, and twined together.

The Viper varies considerably in its colouring; a circumstance which has led some naturalists to consider that our island contains more than one species, but this is an error. The ground colour is mostly olive, sometimes deep brown, sometimes yellowish brown, and sometimes brick-red. A mark between the eyes, a spot on each side of the head, and a broad zigzag stripe, composed of confluent rhomboidal spots down the back, to the end of the tail, are darker than the ground colour, and sometimes black. A line of spots, of a dark or black colour, runs down each side. Mr. Bell possesses an elegant specimen, taken in Hornsey Wood, which is nearly white, with the markings jet black. Black Vipers are occasionally found. This species seldom exceeds a foot and a half in length.

The Viper brings forth its young alive, like the viviparous lizard. These, though but a few inches in length,



crawl about, and are as fierce as the parent, throwing themselves into an attitude of defence when molested, and hissing with anger. White, in his "Natural History of Selborne," states, that on one occasion, a large Viper being killed was found to contain fifteen young ones alive; they had the true Viper spirit in them, and were very alert, twisting about, and showing manifest tokens of menace and defiance.

It has been often asserted, that, in moments of sudden danger, the young brood, when with the parent, take refuge in her gullet, her mouth being stretched widely open to admit them. "Several intelligent folks," says White, "assure me, that they have seen the Viper open her mouth to admit her helpless young down her throat, on sudden surprises, just as the female opossum does her brood into the pouch, upon the like emergencies; yet the London viper-catchers insist on it, to Mr. Barrington, that no such thing ever happens."

Mr. Bell, in his "British Reptiles," does not allude to this circumstance. We have never met with an instance ourselves; and hesitate to attach much credit to the report.\*

Mice, lizards, and nestling-birds, are the food of this species; and, as Mr. Bell observes, it does not always confine its voracity within its powers of swallowing; for, he adds, "I have, in my possession, a specimen of a small Viper, taken on Poole Heath, in Dorsetshire, in a dying state, in the act of attempting to swallow a mouse, which was too large for it, the skin of the neck being so distended as to have burst in several places." An analogous case is related by Mr. Cox in the "Magazine of Natural History" for 1838. The Viper in question was found in the neighbourhood of Lausanne; it had "seized a common lizard of full size, and swallowed it. The Viper was a young one, and the lizard nearly as long as itself. It also appeared to have been very strong, and to have retained its vitality long after it descended

\* The same circumstances are related of the Rattlesnake.

into the stomach of its devourer. The consequence was that it scraped with its little nails, until it made a hole through the side of the Viper, and the fore leg was completely protruded." The specimen is preserved in the Musée Cantonal, at Lausanne.

Sweden produces the *ÆSPING*, called in England, the *ASPIC*, (*Pelias chersæa*), a small Reptile, seldom exceeding six inches long, but more virulent, as it is said, than the common Viper, of which some naturalists regard it, and perhaps correctly, as a mere variety. Linnæus, as it is affirmed by Acrell, saw a woman perish in consequence of the bite of one, notwithstanding every assistance: it is said, that in Smaland persons sometimes fall victims to these Reptiles. The effects of the bite are followed by intense anguish and vomiting, the tongue swells and stiffens, the limb becomes inflamed, coldness supervenes, and, occasionally, death closes the scene.

In the south and east of Europe, we find the *Vipera ammodytes*, which is common among the rocks bordering the Danube, and on the mountains of Illyria. Its bite is very virulent, often producing death, and always, at least in summer, dangerous and painful effects.

A distinct species, the *Vipera aspis*, of the Prince of Musignano, is found in Sicily and Italy.

The Viper, or Apeh, is often alluded to in the Scriptures, as an emblem of malignity and mischief: this Viper is not, however, our common species, but one much more dangerous; perhaps, the *Vipera Ægyptica*, Latreille, which he considers to be the Aspic of the ancients; or, perhaps, a large species, the *Vipera Euphratica*, (described in the "Proceedings of the Zoological Society," 1838, p. 82.) which is extremely venomous, and found in the country bordering the Euphrates.

In this Viper, and in the *Vipera elegans*, and their allies, there is a deep pit behind the aperture of the

nostrils ; as is also the case in the Rattlesnakes, and in the genus *Trigonocephalus*.

The CERASTES belongs to the Viperine section ; and is, probably, the adder mentioned in Genesis, “ Dan shall be a serpent by the way, an adder in the path, that biteth the horse heels, so that his rider shall fall backward,” Gen. xlix. 17.

The Cerastes, (*Vipera cerastes*, Laur.,) was well known to the ancients. It is a native of Egypt and Lybia, and is distinguished by the presence of a little horny spur above each eye ; these spurs are not attached to the bone, but are implanted among the scales of the head, being, indeed, a modification of scales ; and they are slightly moveable. The head is large, and flattened above ; the body is thick ; the tail slender and short ; the iris of the eyes is yellow, and the pupil is a perpendicular fissure. The general length of this species is about two feet ; and the colour sandy red, or yellow, with irregular brownish markings ; whence it assimilates with the colour of the sands of the desert, its abode, and cannot be easily distinguished. Thus it may be trodden upon unsuspectingly, by man or cattle, and inflict a poisoned wound, before its presence is perceived.

Herodotus notices this Serpent as common about Thebes. “ There are about Thebes sacred Serpents, entirely innoxious to man. They are of diminutive size, and have two horns sprouting from the crown of the head ; and, when they die, they are buried in the temple of Jupiter to whom they are said to be sacred.” In saying that they are not venomous, Herodotus is in error ; and there is reason to suppose, that the species which the ibis destroys, and of which he saw multitudes of the bones in a defile, near the plain of Egypt, were those of the Cerastes ; though he states them to be the remains of Serpents, flying “ with wings not like those

of a bird, but rather with membranes, like those of a bat."

The Egyptians placed the image of this Snake among their hieroglyphic figures, and it is to be seen well represented on many of the stones of their temples; as, indeed, is also the Cobra.

Most of the ancient writers, or of the middle ages, have asserted, that the Cerastes possesses the faculty of winding in tortuous flexures, beyond any other Snake, and that it never proceeds in a direct line, but describes a series of curves or eircles, the rustling of its scales making a perceptible sound. They have also attributed to it great cunning; and supposed that it concealed itself in holes near the road side, to dart upon travellers unaware of its presence; whence it has obtained the appellation of the insidious, or liar in ambush. Neither the cunning and wiles, nor yet the venom of the Cerastes, are able to save it from becoming the food of birds of prey, and of the sacred ibis, which now, as in days long past, kills it with impunity.\*

It is supposed, that the Cerastes has extraordinary powers of enduring hunger and thirst. It inhabits the arid deserts, where little or no water is to be obtained; but with respect to food, as it preys upon young gerboas, lizards, and insects, it is seldom constrained to long fasts, for these abound on every side, and its temperament suits it to the localities in which it lives. The following details relative to the Cerastes, from Bruce, are very interesting.

So grateful is heat to this Snake, that though, as he says, "the sun was burning hot all day, when we made a fire at night, by digging a hole, and burning wood to charcoal in it, for dressing our victuals, it was seldom

\* Cuvier found in one of the mummies of the sacred ibis, (*Ibis religiosa*,) the still undigested remains of the skin and scales of a Serpent; and, he observes, "the Serpents, from which the ibis delivered Egypt, are represented to us as very venomous, but not as very large."

that we had fewer than half-a-dozen of these Vipers, which burned themselves to death by approaching the embers."

With regard to the poison, he says, "It is very copious for so small a creature; it is fully as large as a drop of laudanum dropped from a phial, by a careful hand. Viewed through a glass, it appears not perfectly transparent or pellucid. I should imagine the Reptile has other reservoirs than the bag under the tooth, for I compelled one to scratch eighteen pigeons upon the thigh, as quickly as possibly, and all died in nearly the same interval of time; but, I confess, the danger attending the dissection of these parts made me so cautious, that any observations I should make upon these parts, would be less to be depended upon.

"I kept two of these creatures in a glass jar for two years without having given them any food; they did not sleep, that I observed, in winter, but cast their skins the last days of April.

"The Cerastes moves with great rapidity, and in all directions, forwards, backwards, and sideways. When it inclines to surprise any one who is too far from it, it creeps with its side towards the person, and its head averted, till judging its distance, it turns round, springs upon him, and fastens upon the part next to it; for it is not true that the Cerastes does not leap or spring.

"I saw one of them at Cairo, in the house of Julian and Rosa, crawl up the side of a box, in which there were many, and there lie still as if hiding itself, till one of the people who brought them to us came near him; and though, in a very disadvantageous posture, sticking as it were perpendicular to the side of the box, it leaped near the distance of three feet, and fastened between the man's finger and thumb, so as to bring the blood. The fellow showed no signs either of pain or fear; and we kept him with us full four hours without his applying any sort of remedy, or seeming inclined to do so.

“ To make myself assured, that the Reptile was in its perfect state, I made the man hold it by the neck, so as to force it to open its mouth, and lacerate the thigh of a pelican, a bird as big as a swan. The bird died in about thirteen minutes, though it was, apparently, affected in about fifty seconds.”

After entering upon the subject of the incantation of Serpents, and the fearless way in which the snake-charmers handle the Cerastes, he adds:—“ I have seen at Cairo, a man, who came from above the catacombs, where the pits of the mummy birds are, who has taken a Cerastes with his naked hand, from a number of others, at the bottom of a tub, put it upon his bare head, covered it with the common red cap he wears, put it in his breast, and tie it about his neck like a necklace. After which, it has been applied to a hen, and bit it, which has died in a few minutes; and, to complete the experiment, the man has taken it by the neck, and beginning at the tail, has eaten it as one would do a carrot, or a stock of celery, without any seeming repugnance.”

Bruce's idea is, that certain tribes of Arabs acquire an exemption from the bite of venomous Snakes, by chewing a certain root, and by washing themselves with an infusion of certain plants in water. But he thinks that the black people of Sennaar are *naturally* proof against the poison; and, he observed, that when these men handled Snakes, however lively before, they seemed as if taken with sickness and feebleness. It is very probable, that the natives of these countries may possess some secrets respecting both the cure, and the mode of rendering themselves proof against the bite of Snakes; but that any men are *naturally* exempt from the evil effects of the poison, is palpably erroneous. If Bruce's statements be literally true, we have yet to wait for a satisfactory explanation of the facts. M. Cloquet considers Bruce to have been credulous, and imposed upon by the dexterity of jugglers.



Dr. Smith figures and describes a *Cerastes* from South Africa, (*Cerastes caudalis*,) which inhabits dry sandy situations. It is indolent in its habits, and will remain motionless in the same spot for days together; but when molested, or accidentally trodden upon, as sometimes happens, its movements are rapid in the extreme; and, if it seizes, it retains its hold with the pertinacity of a bull-dog. It is greatly dreaded by the natives.

South Africa produces many poisonous Snakes of the Viperine section, of which one is known as the PUFF ADDER, (*Vipera arietans*,) and so called from its mode of inflating itself when irritated. It is extremely venomous, but sluggish in its movements, and easily avoided; it is, however, capable of throwing itself backwards with a sudden impulse; but, unless provoked, it never attempts to injure. Its body is thick in proportion to its length, and its tail is remarkably short.

With the venom obtained from this and other poisonous Snakes, the Bushmen prepare a glutinous substance, in which they dip the points of their arrows, and thus render even a slight wound from them fatal. "The boldness and dexterity displayed by these wild huntsmen, and by many, also, of the colonial Hottentots, in searching out, and seizing alive, the formidable Cobra da Capello, and Puff Adder, are truly astonishing. Still more surprising is it to witness the snake-hunter extracting from the yet living and writhing Reptile, held fast by his naked foot planted on its neck, the little bag containing the secreted venom, which the animal, in its rage, injects into the wound made by its fangs, at the moment it strikes its victim; to see him take this, and fearlessly drink its contents, as school-boys in England would suck the blob of the honey-bee!

"The swallowing of this venom, they conceive, renders them, in time proof against its deleterious effects,

when it is brought into immediate contact with the blood, whether by the bite of a Snake, or the point of an arrow.

“ The more usual object, however, of the Bushman in catching Serpents, exclusive of their value to him, as an article of food, is to procure poison for his arrows. The animal venom, too thin and volatile to preserve its efficacy long unimpaired, when used alone, is skilfully concocted into a black glutinous consistency, by the admixture of powerful vegetable and mineral poisons; the former being generally the juice of the root of a species of amaryllis, called by the boors, from this circumstance, the ‘*gift-bol*,’ or poison bulbs; the latter a bituminous or unctuous substance, which is said to exude from certain rocks and caverns. With this deadly mixture, the dwarfish and despised African anoints the desperate weapons with which he resists, though unavailingly, the aggressions of the colonists, and sometimes cruelly revenges the injuries they have inflicted.”

From the anonymous correspondent to the “ Penny Magazine,” whose words we have just quoted, we borrow the following:—“ It is from apprehensions of danger, or the instinct of self-defence, far more than from any peculiar fierceness, or innate malignity, that the Serpent race ever assail man, or any of the larger animals. They turn, of course, against the foot that tramples, or the hand that threatens them; but, happily, Providence has not armed them, in addition to their formidable powers of destruction, with the disposition of exerting these powers, for motives of mere wanton cruelty, or for purposes unconnected with their own subsistence or security. Were it otherwise, countries like the Cape would be altogether uninhabitable. As it is, the annoyance experienced from the numerous poisonous Snakes is not such, as, on the whole, to affect, in any considerable degree, the comfort of those accustomed to them.

“ Conversing on this subject, one day, with my

friend, Captain Harding, who had been, for many years, a resident and magistrate in the interior, I inquired whether he had ever, in the course of his campaigns on the Caffer and Bushman frontiers, when necessarily obliged to sleep in the desert, or jungle, in the open air, suffered injury, or incurred danger from Serpents; he replied, that the only occasion he recollected of incurring any great hazard of this sort, was the following:—

“ Being upon a military expedition across the frontiers,” said he, “ I had slept one night as usual, wrapped in my cloak, beneath a tree. On awaking, at day-break, the first object I perceived, on raising my head from the saddle, which served for my pillow, was the tail of an enormous Puff Adder lying across my breast, the head of the Reptile being muffled under the folds of the cloak, close to my body, whither it had betaken itself apparently for warmth, during the chillness of the night. There was extreme hazard, that if I alarmed it by moving, it might bite me in a vital part. Seizing it, therefore, softly by the tail, I pulled it out with a sudden jerk, and threw it violently to a distance. By this means I escaped without injury; but, had I unwittingly offended this uninvited bed-fellow, before I was aware of his presence, I might, in all probability, have fatally atoned for my heedlessness.

“ It is not very unusual for Snakes, of various sorts, to be found in the houses at the Cape; nor does it, in ordinary cases, excite any violent alarm, when such inmates are discovered. They make their way both through the roofs and under the walls in search of food and shelter, and especially in pursuit of mice, which many of them chiefly subsist upon.”

The same observations, respecting the ingress of Snakes into houses, apply equally to India, and other parts of the east. In these countries, Snakes not venomous are little noticed when found intruding into the abodes of the natives, who, from habit, are reconciled

to them; but sometimes fatal accidents arise from Snakes of a venomous character. Where these Reptiles abound, we are not surprised at such casualties.

Turner, in his "Tour in the Levant," says, "In the fields round Aere are many Snakes and Vipers; a young labourer, cutting corn last year, was bit by a Viper; and, in spite of all the assistance his friends could procure him, he died in a few hours. And five or six years ago, the pasha lost a son eight months old, who had been left sleeping alone in his cradle; and was found dead, with an immense Snake coiled upon his breast asleep, which had not bitten him, but had either suffocated him with its weight, or chilled him with its cold."

#### GENUS TRIGONOCEPHALUS.

To the Viperine section belongs the genus *Trigonocephalus*, of which the LANCE-HEADED VIPER, of the island of Martinico, is an example.

This formidable Reptile (*T. lanceolatus*) appears to exist only in the islands of Martinico, St. Lucia, and Beconia, to the exclusion, happily, of the rest of the Antilles. It is, however, said to be found in Brazil, and other parts of South America.\* It attains to six or seven, and sometimes even nine feet in length, and is greatly dreaded. When the Lance-headed Viper intends to attack, it rolls itself up in a spiral manner, and rapidly unwinding itself, is propelled, with arrow-like velocity, on its prey. It is said to be remarkable for activity, and many negroes fall victims to its bite, while working among the sugar-canes, where it abounds; fifty

\* A tradition exists among the Caribs, that it was introduced into Martinico by the Arronages, a tribe dwelling near the mouth of the Orinoco, who, impelled by a desire of vengeance, brought numbers over in calabashes, and let them loose in the forests. A contrary opinion is, that this Snake is a native of Martinico, and cannot live elsewhere. Some, however, attribute its non-existence in Dominica and St. Vincent, to a species of Boa found there, which they regard as having extirpated it, or prevented the continuance of the race.

or sixty being often killed in a single field. It is not only in jungles of sugar-cane that these Snakes are found; but in marshes, in forests, in cultivated lands, along the borders of rivers, and on the highest mountains. They swim, and climb trees, and may be often seen intertwined among the topmost branches. M. Moreau de Jonnès and his companions, on their ascent to the edge of the crater, at the pinnacle of a mountain, more than five thousand feet high, which overhangs the town of St. Pierre, Martinico, encountered one of these Snakes at the summit; from which, as they were completely exhausted by their exertions, they were in great danger. It was only eight days previously that a fisherman, shooting his canoe over the volcanic pebbles of the shore, at the base of the same mountain, was attacked by one of these Snakes, which had concealed itself among the masses of basalt, and all efforts to save his life were unavailing.

The bite of the Lance-headed Viper is not, however invariably fatal; the strength of the venom depending much upon the season of the year. It would appear that this Reptile, on the slightest provocation, or even without it, will dart upon passengers incautiously approaching its retreat, and also pursue them by a series of rapid and multiplied leaps; it will spring upon them from the trees, as they traverse the woods, or display its threatening head, as it hangs suspended from the branches.

Man is not alone in his dread of this Reptile; the horse is said to prance, and tremble at its presence; and when among the trees, it is surrounded by flocks of terrified birds, uttering cries of alarm and distress, and pursuing it as it moves along. Not only is the power of fascination attributed to it, but the negroes consider it commissioned to kill the person doomed to destruction by the offended gods or spirits.

The Lance-headed Viper is often brought into the towns concealed among green fodder, and vegetable

productions; and numbers often enter, during their nightly excursions, into the outworks of Fort Bourbon in Martinico, and of Fort Luzerne in St. Lucia, where they are despatched as quickly as possible. They also invade houses in the country, and especially the cottages of the negroes, which are generally surrounded by bushes, tall grass, and jungle. They not unfrequently visit poultry-yards and pigeon-houses; and lurk concealed among the parasitic plants, as the lianas, which encircle decayed and fallen trees; sometimes they appropriate to themselves the nest of a bird, the young of which they have devoured, and there lie coiled up; and sometimes they lurk in the holes of rats, which they are ready to pursue. It is, however, chiefly among dense herbage, and in the close thickets formed by strong grasses and canes, that they prefer to dwell, lurking under the decomposing bed of herbage and leaves, from which the canes rise up. Their prey consists of birds, lizards, and especially rats, the latter having been introduced by European shipping, and multiplied almost incredibly. Their destruction of these foreign pests is the only good service they do to man; but it is a service which a harmless species would perform much more satisfactorily.

After swallowing their prey, these Snakes exhale a disgusting odour; this, however, does not prevent the negroes from eating their flesh, which they find, it is said, free from any unpleasant flavour.

Closely allied to this formidable Reptile is another dreaded species, the BUSHMASTER, (*Lachesis rhombata*), which attains to the length of eight or nine feet. It is a native of Guiana and Brazil, and is exceedingly venomous. The genus is characterized by double scuta beneath the tail, which ends in a short horny point.

Mr. Darwin met, at Bahia Blanca, with a Reptile apparently belonging to this genus. "Of Reptiles,"



(at this place,) he says, "there are many kinds; one Snake, a *Trigonocephalus*, or more properly a *Cophias*, from the size of the poison-channel in its fangs, must be very deadly. Cuvier, in opposition to some other naturalists, makes this a sub-genus of the Rattlesnake, and intermediate between it and the Viper. In confirmation of this opinion, I observed a fact, which appears to me very curious and instructive, as showing how every character, even though it may be in some degree independent of structure, has a tendency to vary by slow degrees.

"The extremity of the tail of this Snake is terminated by a point, which is very slightly enlarged; and, as the animal glided along, it constantly vibrated the last inch; and this part, striking against the dry grass and brushwood, produced a rattling noise, which could be distinctly heard at the distance of six feet. As often as the animal was irritated or surprised, its tail was shaken, and the vibrations were extremely rapid. Even as long as the body (after death) retained its irritability, a tendency to this habitual movement was evident.

"This *Trigonocephalus* has, therefore, in some respects, the structure of *Vipera*, with the habits of a *Crotalus*; the noise, however, being produced by a simpler device.

"The expression of this Snake's face was hideous and fierce. The pupil consisted of a vertical slit, in a mottled and coppery iris; the jaws were broad at the base; and the nose terminated in a triangular projection."

#### GENUS ACANTHOPIS.

The genus *Acanthopis* also links the Viperine group to the Rattlesnakes, the tail terminating in a simple horny spine, instead of being invested, as in the latter, with dry scaly pieces, resembling so many little bell-like appendages, which form a rattle. There are no depressions behind the nostrils; and the head is covered

in front with large plates; the scuta or plates beneath the tail are double.

The ACANTHOPIS CERASTINUS, Daudin, a native of India, is an example; as is also the ACANTHOPIS BROWNII, a native of New Holland, and one of the most formidable Snakes, from its venom, in the neighbourhood of Sydney.

Mr. George Bennett, speaking of the Reptiles of New Holland, observes, that "Snakes are numerous in various parts of the colony. Those known among the colonists, as the Black and Brown Snakes, are found about the banks of rivers, or in swampy situations. The natives (who, however, are not the best authorities) say, that the bite is not deadly, but causes the person bitten to feel sick and sleepy for a short time, which passes off without being followed by any farther ill effects, even if no remedy be applied.

"I examined a Black Snake, which had been just killed, at the farm of Gudarigby, upon a flat near the river; it was of a shining silvery black colour above, the abdomen being dark red. It measured three feet and a half in length, and at its largest circumference three inches. The stomach was filled with a quantity of green frogs with golden spots. This Snake appears to be a species of the genus *Acanthopis*. By the natives of Yas, the Black Snake is called *Bulbuk*."

"The Brown Snake, which I examined, is venomous; and, according to popular opinion, the effect of its bite is very dangerous upon the human constitution. The specimen measured nearly five feet in length, and five inches at its largest circumference. The upper part of the body was of a brown colour, with a few light shades of black; the abdomen was of a light bluish black. In the stomach were found several half-digested lizards.

"Both the Black and Brown Snakes take to the water, on the appearance of danger; they procure their food on the banks of streams.

“ There is another dangerous Snake called YELLOW SNAKE by the colonists, and *Jaruk* by the Yas natives. It attains a large size, and has the reputation of being very venomous, the bite (unless the piece bitten be immediately cut out) producing almost immediate death.

“ The most deadly Snake in appearance, and, I believe, also in effect, is one of hideous aspect, called by the colonists the DEATH ADDER, and by the Yas natives *Tammen*, from having a small curved process at the end of the tail, or more correctly, the tail terminating in a small curved extremity, bearing some resemblance to a sting, and the Reptile is (erroneously) considered to inflict a deadly sting with it.

“ This hideous Reptile is thick in proportion to its length; the eye is vivid yellow, with a black longitudinal pupil; the colour of the body is difficult to describe, being a complication of dull colours, with narrow blackish bands shaded off into the colours which compose the tinting of the back. The abdomen is slightly tinged with red. The head is broad, thick, and flattened. The specimen I examined measured two feet, two inches in length, and five inches in circumference. It is, I believe, an undescribed species. A dog that was bitten by one, died in less than an hour. The specimen that I examined was found coiled up near the banks of the Murrumbidgee river; and, being of a torpid disposition, did not move when approached, but quietly reposed in the pathway, with its head turned beneath the belly.

“ It is said, that when cattle are bitten by a venomous Snake, they resort immediately to the water. A cow was found lying dead, near the river, at Gudarigby, during the time I visited the farm; and, from the appearances which the body presented, the stock-keepers formed an opinion, that its death was produced by the bite of a venomous Snake.”

These Snakes, and especially the former kinds, prove very annoying to stock-keepers, and persons residing

in the remoter parts of the colony, as they enter the huts or cabins, and lie concealed for weeks together, until discovered by accident.

“On the 19th of November,” says Mr. Bennett, “I visited the farm at Gudarigby, the property of W. H. Dutton, Esq., in company with his brother, Mr. F. Dutton, and Mr. Manton. We remained the first night in the bark hut, erected on Mr. Manton’s farm. Snakes of the black and brown species are very numerous at this place, no doubt arising from the location being close to the Murrumbidgee river. We had sufficient proof of the existence of these Reptiles, from seeing several which had been recently destroyed by the man on the farm. One had dropped from the back shed upon a man’s bed during the night, and occasioned him to quit, and leave the Reptile in undisturbed possession for the remainder of the night. In the morning search was made; the Reptile discovered among the blankets, and killed. It was a Black Snake, more than three feet in length.

“The warmth of the valley in which the farm is situated, and its proximity to the river, render it an agreeable retreat for these Reptiles. We slept, however, during the night without experiencing any visits from them, though we fully expected to feel their cold bodies gliding over us.”

#### GENUS CROTALUS.

The Crotaline group, or, in other words, the Rattlesnakes, now present themselves to our notice.

These celebrated Serpents are all peculiar to America. The head is covered with scales, but in one sub-genus with plates; a small depression is behind each nostril. The scuta beneath the tail are undivided; the extremity of the tail is furnished with a rattle, formed by the dry terminal scales, which present the appearance of a string of hollow, semi-opaque, quadrangular bells, received within each other in such a manner, that only a third of



RATTLESNAKE.





each is visible; they vary in number according to age; the basal bell is the last formed, and the largest: and one is said to be added yearly. When the tail is rapidly vibrated, these dry hollow portions rustle against each other, and produce a distinct whirring noise, which may be heard at some distance. Rattlesnakes, especially when irritated, exhale a disgusting odour. The peccary, however, is said to destroy and devour them, as does the common hog also; but horses and dogs avoid them. M. Bosc says, "I have often amused myself by trying to force my horse and dog to approach one of these animals, but they would sooner have allowed themselves to be knocked down upon the spot than come near them." These Reptiles are sluggish and inert in their movements; and, though highly venomous, seldom attempt to inflict an injury on man, unless molested by him. They never ascend trees, always capturing their prey on the ground. They usually rest coiled spirally, in paths, or clean spots in the woods, waiting for their prey, upon which they dart when within the proper distance. (See engraving.)

On the approach of man, the tail is vibrated rapidly, and the whirring noise produced; if farther irritated, the head becomes flattened, the throat and cheeks swell, the lips contract, the jaws open widely, displaying the horrid fangs, the tongue is darted out, and quivers with excitement, and the body swells and sinks, like a forge bellows, with rage. Yet it forbears to strike; farther irritation adopted, and the blow is struck: if, however, its foe retire, it uncoils its body, and creeps quietly away, but with erect tail, and sounding rattles. It would seem, if Kalm be correct, that horses and oxen sink under the bite of the Rattlesnake, sooner than dogs or men. Dogs, however, seldom survive. Captain Hall caused a Rattlesnake, four feet long, to be secured, and exposed some dogs to its bites: the first struck with its murderous fangs died in fifteen minutes; the second lingered in agony for two hours before death

ended its sufferings; the third began to feel the effects of the poison in the space of three hours.

Four days afterwards the same Snake bit a dog, which died in thirty seconds, and another dog which died in four minutes. Three days having elapsed, a frog bitten died in two minutes, a pullet in eight. Sometime afterwards, a white *Amphisbæna* was presented to it; and being wounded, it died in eight minutes; but this Reptile bit the Rattlesnake in turn, which expired in about twelve minutes. The *Amphisbæna*, however, is not venomous. Some Rattlesnakes grow to a very large size. Bartram states, that he has seen some six feet long, and as thick as a man's thigh; and that in the early period of the settlement of Georgia, as he has been credibly assured, they have been observed of seven, eight, and even ten feet in length.

Rattlesnakes are viviparous; and it is said, that when alarmed, as reported in the instance of our Viper, her young take refuge in her throat. Several species of Rattlesnake are known: of these, we may enumerate the *BOQUIRA*, as the natives of Brazil term it, "the queen of the Serpents;" among the Mexicans, the *DIAMOND RATTLESNAKE*, (*Crotalus horridus*), which is abundant chiefly in Mexico, Guiana, Brazil, and the Antilles; the *COMMON, OR BANDED RATTLESNAKE* of the United States, (*Crotalus durissus*);\* and the *MILIARY, OR LITTLE CAROLINA RATTLESNAKE*, (*Crotalophorus miliarius*.)

The first species is the largest, and is often found six feet in length; but the Common Rattlesnake seldom exceeds four, and one of this size can swallow the American hare, (*Lepus Americanus*.)

"From New York to Savannah, and beyond, and

\* The terms, *horridus* and *durissus*, have been loosely and indiscriminately applied to these species by naturalists. Cuvier assigns the term *horridus* to the United States' species, and *durissus* to the South American. We adopt the terms, as applied by Dr. Harlan of Philadelphia, in his "North American Reptiles."

from the borders of the sea, far to the west and north-west," says M. Palizot-Beauvois, in his 'Memoir on Serpents,' "Rattlesnakes, to the number of three distinct species, are found in abundance. That to which Linnæus has given the name of *Horridus* (?) so dangerous in the south, of which the effects resulting from the bite are so exaggerated in the north, and which is known to be so susceptible of being rendered torpid by cold and frost, presents to the unprejudiced observer much to interest him, and peculiarities in direct contradiction to the fables attributed to it.

"Frightful as this Reptile appears to the eyes of prejudice, certain it is, that few animals are more peaceful, and less inclined to do mischief than the Rattlesnake. It never attacks animals on which it does not feed; and if it be neither alarmed, nor molested, it never attempts to bite. I have often traversed a path, at the distance of a foot from a Rattlesnake, without its displaying the least desire to seize me. I have always been warned of its presence by the noise of its rattle; and while I have retreated without any great haste, it has never stirred from the spot, never changed its posture, but has given me time to cut a stick for the purpose of despatching it. Dangerous as its bite is supposed to be, and which in fact it is, during certain months of the year, and especially if the tooth pierces a blood-vessel, still, when the Reptile has retired to its winter abode, it may be handled without danger; not that it is to be found there in a state always of torpor and inactivity, for it is only in the middle of winter, and during hard frosts, that we find these animals intertwined together in ball-like masses, and totally torpid. On the approach of spring, the season in which, if I may so express it, Serpents re-appear among the number of living beings, the Boiquira begins to move: at first, as if to rouse itself from its torpor, and try its strength, it crawls slowly among the roots of trees; by degrees, it becomes more animated, and the more so as the time of its

liberation approaches. Sometimes, a fine day temporarily hastens this epoch, and they creep forth from their holes, stretch themselves, and bask in the sun; but still they will not bite. Burdened with their old skin, which they are waiting for the time to throw off, their sight, as in all other Serpents, is very defective; and they seem to me, as if they are labouring under some malady, which takes away both the desire and the power to injure.

“In the month of February, 1797, we went with Mr. Pence, of Philadelphia, to hunt for Rattlesnakes, which are numerous in New Jersey; we caught nine, and almost all with the hand, in the space of two hours. Although they had already begun to sound their rattles, not one of them displayed the least inclination to bite.

“In summer, this Reptile is more dangerous; but as I have already said, it is never until after being alarmed, or touched, or struck; it then, indeed, instantly coils itself round, and warns by its hissing, and the rapid rattling of its tail, of its angry desire for vengeance. Then, woe to the man or animal within its reach.

“Its bite, from the moment it emerges from its retreat, till August, does not necessarily produce fatal results. It has been remarked, and the observation has not escaped the Indians, that from the month of August, to the time when it is about to retire to its winter quarters, the period in which it takes the most food, it becomes terrible, and its bite mortal.

“We know that Serpents in general retire, on the approach of winter, according to the nature of the ground, and the temperature of the places they tenant, either under large stones, or into holes which other animals have burrowed. The Boiquira gives preference to places in the vicinity of water. We have dug up many of their holes on the borders of the river Maurice. They were all tortuous, and led to a sort of chamber, distant from the entrance six or eight feet; and there

we have found them in balls, and twined together. Our guide led us, on one occasion, into a marshy place, covered with a prodigious quantity of the ‘sphagnum palustre,’ a kind of moss, of which the stems are from six to twelve inches high. Having removed some of this moss, of which the top was frozen, (the frost being so severe that it penetrated the naked ground, to the depth of twelve or fourteen inches,) we perceived many Rattlesnakes, slowly creeping among the roots of the trees, immediately beneath the moss, and on an oozy ground, over which flowed running water not affected by the frost. Here I would make a passing remark, that this fact may be turned to account by persons employed in agriculture, or gardening; this moss might be employed for the preservation of delicate plants, liable to be killed by the severity of winter.

“Numerous experiments prove that the Rattlesnake eats indifferently all kinds of dead birds he meets with; and that he employs no supernatural means, as asserted, to seize his victims. He does not, however, eat frogs, to which the Black Snake (*Coluber constrictor*) is so partial.”

Some experiments which Mr. Pence made upon a Rattlesnake, which he kept alive for five years, and on a Black Snake, may not be unacceptable. A living bird (an oriole) was introduced into the cage of the Rattlesnake, and there remained for two days, during which time the Reptile never attempted to bite it. The bird betrayed no fear, and experienced no ill effects from the air of the cage. A dead bird being introduced, was, however, eaten; while the living oriole was fluttering about untouched.

A cardinal grosbeak was then put in, and this bird, so far from avoiding the Reptile, pecked at ease about the cage, picked up the seeds, and even hopped upon the Snake’s back; but it retreated when it heard the noise of the rattle. Frogs, both living and dead, were

presented, but it would not touch them; the Black Snake, however, seized them instantly.

At last, a common rat was put into the Rattlesnake's cage. Scarcely was it fairly in, when the Reptile appeared animated; the rat, as if alarmed, fled to the opposite side of the cage, away from the Snake; the latter gave chase, and followed for about forty seconds very deliberately, the rat being eager to avoid its pursuer, and exerting itself to the utmost. The Snake then, seizing a favourable moment, struck its prey. The rat ran bewildered about; the Snake lay motionless. At the end of a minute, the rat became greatly swollen, and died in convulsions; and was soon swallowed.

These convulsions, and this bewildered state, have doubtless tended to give rise to the popular belief in the Rattlesnake's power of fascination.

A correspondent of the "Penny Magazine," gives us the following account, which proves that Rattlesnakes are not unfit for food, and may be placed among the multifarious articles regarded by man as delicacies of the table. "Rattlesnakes," he writes, "are very rarely found in the 'beech' or 'green' woods—woods where beech, maple, ash, and birch timber predominate; but are the most numerous on the dry and arid ridges of the hills, which are designated 'oak barrens.' In sandy soils, where pine timber generally abounds, these Reptiles are exceedingly scarce, and excepting some sections of the upland prairies, and the river hills, very few of them inhabit the wilderness of the 'far west.'

"In my many and long rambles in various parts of the country, I am not aware that I ever ran any great risk of being bitten by one of these much-dreaded Snakes. I have been somewhat startled occasionally, it is true, on seeing them stealing away through the bushes and wild grass adjoining the path I have been pursuing; and in a few instances, I must acknowledge having been a little alarmed on hearing them rattle the



scales of their tails, thereby warning me to be on the 'look out.'

"Amongst persons the best capable of judging, because the most familiar with this matter, I believe there is no difference of opinion regarding this point, namely, that they always endeavour to escape from the presence of man; but when they find retreat impracticable, they then spring their rattles, as a warning that they are prepared to act upon the principle of self-preservation: the first aggressors, I believe, they never are.

"The Indian tribes possess different antidotes against the bite of the Rattlesnake, and also the bite or sting of other poisonous Reptiles, and insects; so that, although they possessed no knowledge of medicine, as a science, when the country was first settled by Europeans, yet it seems they had providentially become acquainted with many of the valuable secrets of nature. The secrets obtained from the Indians, in addition to the modern discoveries in medical science, tend, in some measure, to allay those apprehensions which once were entertained against the still obnoxious, but less dreaded Rattlesnake.

"The first time I visited the banks of the Mississippi river, in the decline of a fine autumnal day, my guide, an old Canadian hunter, of French extraction, conducted me to an indifferent-looking house, self-styled a tavern, in the (then) small town of Kaskaskia, but even then the principal place on the almost uninhabited banks of that part of the Mississippi. I happened, however, not to be the only traveller in so remote a place; for I soon learned that a party of four or five individuals were to pass the night there. This party had been engaged on an exploring expedition up the Missouri river; and having ascended that river to a certain point, had travelled across the country, separating these two rival streams, and were now on their way back to some of the new settlements on the waters of the Ohio.

“I was well pleased at finding there were other travellers who, like myself, were distant from the haunts of society and civilization; and I presently found myself on familiar terms with the party.

“After a brief interview, they politely invited me to partake of the supper they had already bespoken; informing me, at the same time, that they considered themselves peculiarly fortunate, in having procured an excellent dish; in fact, a great delicacy, in a place where they expected to meet with but indifferent fare. What this great delicacy was they did not attempt to explain; and having without hesitation accepted of their invitation, I felt no inclination to make any farther inquiries.

“When the hour of supper arrived, the principal dish, and, indeed, almost the only one upon the table, appeared to me to be a dish of good-sized eels, fried. I, being the guest of my new acquaintances, had the honour of being the first served with a plate of what the person who presided called ‘musical Jack.’ Musical Jack, thought I, is some species of eel peculiar to the Mississippi, and its tributary waters; and, taking it for granted that it was ‘all right,’ I forthwith began to ply my knife and fork. ‘Stop,’ said the individual that occupied the bottom of the table, before I had swallowed two mouthfuls; ‘you, sir, have no idea, I presume, what you are eating, and since you are our guest for the time being, I think it but right that you should have no cause hereafter to think yourself imposed upon. The dish before you, which we familiarly call musical Jack, is composed of Rattlesnakes, which the hunter, who accompanies us in our tour of exploration, was so fortunate as to procure for us this afternoon. It is far from the first time that we have fared thus; and although our own hunter skinned, decapitated, and dressed the creatures, it was only through dint of coaxing, that our hostess was prevailed upon to lend her fryingpan for so vile a purpose.’

“Although curiosity had on many occasions prompted me to taste strange and unsavoury dishes, I must confess, that never before did I feel such a loathing and disgust as I did towards the ‘victuals’ before me. I was scarcely able to listen to the conclusion of this short address, ere I found it prudent to hurry out of the room; nor did I return till supper was over, and musical Jack had either been devoured or dismissed their presence.

“As far as I recollect the circumstance, there was nothing peculiar or disagreeable in the flavour of the small quantity I ate; and, when the subject was calmly discussed on the following day, one of the party assured me, he was really partial to the meat of the Rattlesnake, although some of the other members of his party had not been fully able to conquer their early conceived antipathies towards this Snake; but that during their long journey, they had been occasionally prevailed upon to make trial of a small quantity of the flesh, and were willing to own, that had they been ignorant of its nature; they should have pronounced it of a quality passably good.

“Ever afterwards, in my visits to Kaskaskia, I narrowly examined every dish of a dubious character that was placed before me, in order to satisfy myself that it was not musical Jack.”\*

With respect to the LITTLE CAROLINA RATTLESNAKE, (*Crotalophorus miliarius*,) which is more dreaded for the intensity of its venom than even the Boiquira, it may be observed, that it is found not only in Carolina, but in Louisiana, and other districts. It is of small size, and its rattle emits only a feeble sound; hence, it is often trodden upon; and from this circumstance, and its habit of

\* The writer was somewhat fastidious in his diet: the negroes eat the flesh of the Rattlesnake, as well as that of other Serpents; and the fat is used as an embrocation in rheumatic affections, in sciatica, etc. When the skin and intestines are removed, no bad odour remains.

coiling itself on fallen trees, logs, or the stumps of felled timber, persons have been known to sit upon it, ignorant of its presence till bitten. It lives principally on the larger insects, such as grasshoppers; but frogs, mice, and other small animals are its prey. It is bold, and will not retreat when threatened; but is easily killed by a blow. Ammonia has been used with success, in cases of a bite from this Reptile.

### MARINE, OR TRULY AQUATIC SNAKES.

The Marine, or truly Aquatic Snakes, (*Hydridæ*,) are all confined to the intertropical latitudes. These singular animals, excepting that they are destitute of fins, are not unlike the eel, especially in the form of the tail, which is expanded in a vertical direction, and compressed laterally, so as to act the part of a paddle in the water, which they tenant. It is only occasionally that these Snakes visit the land; and, in the Indian seas, numbers collected together, forming shoals, may be seen swimming about, in pursuit of fishes and other prey. They are often carried out into the ocean by storms, and drifted upon the shores of distant islands, to the terror of the natives. An instance of this kind occurred in New Zealand. Several sea Snakes, (*Pelamys bicolor*,) which are found in the Indian seas, were driven on the west coast of New Zealand, to the consternation of the natives, who have no Snakes in their island. One of these, preserved by the Rev. William White, Wesleyan Missionary to New Zealand, was presented to the Zoological Society of London, in January, 1838. (See "Proceedings of the Zoological Society," 1838, p. 4.)

The late Rev. J. Williams, in his valuable "Narrative of Missionary Enterprises in the South Sea Islands," observes, respecting the Samoa group, of which Savaii, Tutuila, and Upolu, are the chief, that "Snakes, which are unknown at the Tahitian and Hervey groups, abound here. I was informed, that there were several species

of them, some of which are beautifully variegated. Those they procured for me were of a dark olive colour, about three feet long. There are also water Snakes; some of them beautifully marked with longitudinal stripes of yellow and black, and others with rings alternately white and black. The natives esteem both the land and sea Snakes as good food. In the disorder occasioned by the leak in our ship, and our subsequent sinking at Tongataboo, I lost my Snakes, and many other curiosities which I was conveying home.

“Very large lizards are found on the mountains of Savaii and Upolu, and, from the description I received, I should conclude that they were guanas.”

On another occasion, he alludes to the multitude of Snakes in Savaii, and says, “Having expressed a wish to take a specimen with me to the Society islanders, who had never seen one, the ladies ran out of the house, and returned about half an hour afterwards, each having a live Snake twined about her neck.”

The discovery by Mr. Williams of the existence of lizards, as well as of sea and land Snakes, in the Samoa group, (Navigators’ Islands of maps,) is very interesting to the naturalist. It is singular, that land Snakes should be there; and we are tempted to ask how they came to be introduced. It is also singular, that being there, both the sea and land species should be unknown in the Fiji Islands, the Society Islands, and other groups scattered around.

Russell, in his work on “Indian Serpents,” says, “It is remarked by the Rev. Mr. John, that he never found a land, or river, or a tank Snake with a flat tail; such as are sometimes found in rivers, have been brought in by the tide, and can only live a short while out of salt water. He further remarks, it is difficult to procure sea Snakes, for, though often caught in nets, they are held in such dread by the fishermen, that hardly any inducement can procure them.”

As Cuvier has stated, the sea Snakes are all highly

venomous ; nevertheless, it would seem that John's account of their being dreaded by the natives is not universal. In the "Zoological Society's Proceedings for 1838," p. 80, is the following:—

"A paper was read by Dr. Cantor, entitled 'Observations on Marine Serpents.'

"This communication embodies the results of Dr. Cantor's observations upon the habits and general conformation of the marine Ophidians ; a group to which but little attention has hitherto been given, from the danger attending their examination in the living state ; and, also, from their geographical distribution, being entirely confined to the tropical seas. The author, being stationed in the East India Company's service, on the Delta of the Ganges, had, during a considerable period, most favourable opportunities for studying these Serpents ; many of which were captured in the nets employed for fishing.

"His observations are principally directed to the anatomical characters, which distinguish the marine from the terrestrial Serpents, and to the modifications of structure, by which the former are adapted to the element in which they exist.

"With respect to their physiology, the principal point of interest he establishes, is the circumstance of all the species, without exception, being highly venomous : a fact which has been denied by Schlegel, who states, that the marine Serpents are harmless ; and *the same erroneous idea is current with the natives*. Dr. Cantor, in proof of the contrary, refers to the recent death of an officer in Her Majesty's service, within an hour or two after the bite of a Serpent caught at sea ; and also to numerous experiments of his own, in which fowls, fish, and other animals invariably died within a few minutes after the bite had been inflicted." The observation by John, that sea Snakes are not found naturally inhabiting fresh-water rivers, or tanks, is correct ; they are found, however, in salt-water creeks and ditches."



According to Mr. Gray, the family of Hydridæ consists of twenty-three genera, and forty-eight species; of which twenty are found in the Indian Ocean, and sixteen in the salt-water ditches of India, and the neighbouring islands, and six are found in similar situations in tropical America. Thirty distinct species are in the noble collection of the British Museum.

The genera into which the sea Serpents are divided, are reduced by Cuvier into three sections, or comprehensive genera, *Hydrophis*, *Pelamys*, and *Chersydrus*.

#### GENUS HYDROPHIS.

In *Hydrophis*, the under surface is covered with scuta, or shields, larger than the scales of the other parts; the head is small, not swollen, blunt, and covered above with plates. Some species inhabit the salt-water canals of Bengal, and others the Indian seas.

#### GENUS PELAMYS.

In *Pelamys*, the head is covered with plates; but the back of the head is swollen, in consequence of the length of the peduncles of the lower jaw-bone, which is extremely dilatable, as is also the throat. All the scales of the body are of equal size, small, and disposed hexagonally. Cuvier says, that one species, the *P. bicolor*, though very venomous, is eaten at Otaïti, (Tahiti,) in which assertion he is not correct. Sea Snakes, as already stated, are eaten at Savaii.

#### GENUS CHERSYDRUS.

In *Chersydrus*, both the head and the body are covered with small scales.

Of the habits and manners of the sea Snakes, little is known; many of them attain to considerable dimensions, and we may easily conceive of the ravages they commit among the fishes of the briny waters frequented by them.

A few observations on the poison of Snakes may not be here out of place.

Fontana, who made many experiments with Vipers, and the same observations apply to the Rattlesnakes and others, concludes from his researches :—

1st. That the bite of the Viper is not poisonous to its own body, or that of its species. 2d. The venom is not equally destructive to all animals. 3d. The poison is neither acid, nor alkaline, nor saline. 4th. It has no positive taste, and taken into the mouth does not cause the tongue to swell. 5th. It is not inflammable. 6th. Mixed with water it sinks to the bottom; when shaken it renders the water turbid and whitish.

The assertion of Fontana, that the venom is neither acid, alkaline, nor saline, has been repeated by many writers: Schlegel asserts it; but Dr. Cantor has decidedly proved it to be acid. In five different genera of Indian Serpents, and in different species of marine Serpents, he invariably found the poison to possess the property of turning litmus paper red. Dr. Harlan notices the same fact, in the poison of the Rattlesnake.

Numerous experiments by Fontana, Mangili, Cloquet, and others, prove that, provided there be no abrasion of the skin of the lips, gums, or tongue, the poison of Snakes may be swallowed with impunity; and when a person is bitten by one of these Reptiles, where a cupping-glass is not at hand, or cannot be applied, the best way is instantly to suck the wound forcibly. Celsus was well acquainted with this fact: in the writings of that truly great man, we read, “Those persons who are called *Psylli*, have not, indeed, any special knowledge, but boldness, confirmed by habit; for the poison of a Serpent is not injurious when tasted, but when instilled into a wound. Therefore, whoever, following the example of the *Psyllus*, will suck the wound, will be both safe himself, and save the sufferer. But this point must be fairly settled, that no ulcer be either in the gums, the palate, or any other part of the mouth.”

With respect to remedies, and especially those empirical medicines, commonly deemed efficacious, little can be said. Ammonia used externally and internally, after the poison is drained from the wound, seems to be the most efficacious. As for such herbs as the lion's foot, (*Prenanthis serpentaria*,) Witt's snake-root, (*P. autumnalis*,) Wildenow's snake-root, (*P. rubicunda*,) water plantain, (*Alisma plantago*,) the *Ophiorrhiza mungo*, and others, Dr. Harlan, after a series of experiments, concludes, that they "are either destitute of active properties, or are altogether unworthy serious attention." The great aim must be to keep up the vital energies of the system; to extract the poison, or destroy its injurious properties.

## ORDER IV.—AMPHIBIA.

WE have already stated, that the AMPHIBIA are divided into Caducibranchiate and Perennibranchiate sections, and explained the grounds of those divisions, which we need not again repeat.

All the Reptiles, which we have previously discussed, are covered with plates, shields, or scales. In the Amphibia, on the contrary, the skin is naked, smooth, and often moist, or lubricated with a fluid secretion, which, in some instances, as in the toad, is acrid, and apt to irritate the skin of persons handling it. In the common Salamander of Europe, the fluid poured out from the skin, when the creature is alarmed or injured, is very abundant, and white and glutinous.

The cuticle, as in snakes and lizards, is frequently shed; it is thrown off either in shreds, or altogether, according to the nature of the species. In some, as in the frog, and, perhaps, in all, the skin, as experiments satisfactorily prove, aids the lungs, and even supplies their place, as affording a surface for the aëration of the blood in the delicate cutaneous vessels. In these, as well as in the vessels of the lungs and gills, the blood, by the action of the air, undergoes those peculiar changes which are necessary for the maintenance of life. This cutaneous respiration, as it is called, is a curious and interesting circumstance in their economy. It is proved, however, that it can take place only while the skin is kept moist; and the same observation applies to the gills of fishes, of tadpoles, and of crabs, lobsters, and other crustacea. Hence are the Reptiles furnished with a skin capable of secreting a fluid for the purpose of preserving it in a humid condition; for the healthy action of this skin, as co-operating with the lungs, is essential to their existence.

The general characters of the order Amphibia, may be summed up as follow :—

General form variable ; skin naked ; skull united to the vertebral column by two occipital condyles ; limbs variable ; the toes, in general, unfurnished with claws ; ribs either wanting or rudimentary, and not united to the breast-bone, or sternum ; oviparous. A change of form and habit occurring in many, which commence existence with branchiæ, which are obliterated ; in some the branchiæ continue throughout life ; but in some, although there is an orifice on each side of the neck, no branchiæ have been detected, (as in the genera, *Menopoma* and *Amphiuma* ; ) but, as Professor Bell observes, “ farther observations are necessary to warrant the conclusion of the absolute non-existence of a metamorphosis in these genera.” Müller has proved that the genus *Cæcilia*, which has been hitherto supposed to undergo no change, has, at a very early period, gills, which are soon lost. While we retain the convenient division of the Amphibia into Caducibranchiate and Perennibranchiate, we shall assign to the former the genera *Menopoma* and *Amphiuma*, but on provisional grounds ; at present we know little about them.

## I. CADUCIBRANCHIATE AMPHIBIA.

Amphibia commencing life with gills, as organs for the aëration of the blood ; which, in due time, become obliterated, and lungs developed.

Of the Caducibranchiate Amphibia, our first group contains the *Cæcilia*, or *Ophiosomata* of Dumeril ; Reptiles having a Snake-like body, destitute of limbs, with vertebræ resembling those of fishes, short ribs, and no sternum.

### GENUS CÆCILIA.

At page 10, we alluded to the Linnean genus *Cæcilia* as forming a link between the Ophidian Reptiles and the

Amphibia. Mr. Bell assigning it to the Apodous (footless) division of the latter; Cuvier retaining it among the serpents, in a section apart from the true snakes, under the title “naked serpents,” of which the genus in question forms the only example. Mr. Gray places it at the conclusion of the Amphibia, in an order termed Apoda; and so, also, does Merrem. Fleming, and others, follow the same arrangement. Blainville gives to this section the name of *Pseudophidia*.

Dumeril and Bibron divide the Cæciliæ into four genera, and place them at the head of the Amphibia. Following these latter naturalists, as far as their arrangement is concerned, we cannot but express our opinion, that, though Cæcilia may be intermediate between the snakes and the Amphibia, it is one of those forms, which, while they perplex both the physiologist and the systematic naturalist, serve to prove that nature is not trammelled by artificial divisions and sections. These are often, indeed, arbitrary, or adopted for the sake of convenience; and, while we admit their propriety in general, we cannot shut our eyes to the fact, that God, in his creation, is but partially understood; that a little portion only of his works is within our grasp; and that the application of our rule and line, accurate as we deem the one, and true the other, can be carried on only to a limited extent. He has commanded; and strange creatures, which cannot be contemplated by the physiologist and the naturalist without astonishment, live, and move, and have their being.

The animals of the comprehensive genus Cæcilia are snakelike in their form, and destitute of limbs; the skin, though apparently and really naked, being smooth, viscous, and marked with a regular series of annular furrows, is not utterly destitute of scales. These, it is true, are very minute, and not to be found, except by an examination of the substance of the skin itself. The head is depressed; the eyes beneath the skin are either very minute, or wanting; the tongue is thick, rounded, velvety,



and presents two eminences, corresponding to the posterior nostrils. Besides the true external nostrils, there is a little pit, or depression, termed a false nostril, generally placed beneath the former. There are both maxillary and palatal teeth. The lower jaw has no moveable peduncle, and the tympanic bone is consolidated with those of the rest of the skull. The vertebræ are articulated, as in fishes; and there are two occipital condyles for the attachment of the first vertebra, there being one only in snakes.

Müller, as we have said, has detected the existence of gill-orifices, in a young *Cæcilia*, preserved in the museum of Leyden; the opening on each side of the neck was found by him to be about a line in extent, and of greater breadth than depth; its edge was rough, and internally it contained black-coloured fringes, or gills, which appeared fixed to branches of the hyoid bone, or gill-arches, but did not pass beyond the orifice. These gill-openings freely communicated with the cavity of the mouth. This young specimen in question being unique, could not be spared for dissection. It is four and a half inches in length; whilst an adult animal, of the same species, in which no trace of gill-openings can be discovered, exceeds a foot.

Nine species of this singular group are described. They belong respectively to Asia and America; one of the latter occurring, also, in the Seychelles islands. Of these, seven are American, including the one found in the Seychelles islands, which may be regarded as appendages to Africa, and two are Indian.

These Reptiles, according to the observations of M. Laprieur, during his residence in Cayenne, communicated to Dumeril and Bibron, are ovoviparous, producing their young alive, to the number of six or seven; as does the viper, and other snakes of the same section.

With regard to their general habits, little is known; they bury themselves in the humid earth, or, rather, the soft mud of marshy places, piercing through it like

worms, often to the depth of many feet; they creep slowly on the ground; and, when in the water, swim like the eel, striking to the right and left with their tail.

The WORM-LIKE CÆCILIA, (*C. lumbricoides*), is remarkable for its slenderness, being not thicker than a common goose quill, and measuring two feet in length. It is smooth, excepting towards the tail, which is marked with about fifteen circular folds; the general colour is a blackish brown, or dull olive; no eyes can be detected. It is a native of Surinam.

The WHITE-BELLIED CÆCILIA (*C. albiventris*) is also found in Surinam.

The other American species are the FLAT-TAILED CÆCILIA, (*C. compressicauda*, Bibr.), the SHARP-NOSED CÆCILIA, (*C. rostrata*, Cuv.), also found in the Seychelles islands; the RINGED CÆCILIA, (*C. annulata*, Spix,) the MEXICAN CÆCILIA, (*Siphonops Mexicanus*, Bibr.), and the TWO-BANDED CÆCILIA, (*Rhinatrema bivittatum*, Bibr.)

The SHARP-TAILED CÆCILIA, (*C. oxyura*, Bibr.), is a native of Malabar; the GLUTINOUS CÆCILIA, (*Epicrium glutinosum*, Wagler,) of Ceylon and Java.

The RINGED CÆCILIA (see engraving) is an inhabitant of Brazil, Cayenne, and Surinam. It is remarkable for the bluntness of the tail, the distinctness of the rings; which extend from the head to the latter, and the position of the pits, or false nostrils, below and a little before each eye.

Our next group, the Anoura of Dumeril, comprises the Frogs, the Toads, and their allies, which form a numerous assemblage. In these animals, the form of the body is short and broad. During the tadpole state,



RINGED CÆCILIA.



there are no limbs, but a long, compressed tail is their organ of locomotion; afterwards, four limbs are developed, and the tail disappears. Ribs are wanting. The six or seven anterior vertebræ only are distinct; the tympanic orifice is open; respiration is effected at first



ly gills, afterwards by lungs. The above sketch represents the skeleton of the Frog.

#### GENUS RANA.

The genus *Rana*, of which the Common Frog is an example, is characterized by the skin being smooth, the hinder legs long, and formed for leaping; the hind toes webbed; teeth exist both on the upper jaw, and on the palate; the mouth is wide; the tongue folded back, broad, soft, fleshy, and notched; the eyes prominent.

The COMMON FROG, (*Rana temporaria*,) called the RED FROG (*Grenouille rousse*) on the continent, is well known to all. There is scarcely a river, or a pool, on the margin of which it may not be found; or in the water of which, either adults or their Tadpoles may not

be observed swimming. In Ireland, indeed, the Frog, if accounts be correct, is an introduction, about the beginning of the eighteenth century, by Dr. Gwythers, a fellow of the University of Dublin; since which period, the animal has spread over the country, in spite of St. Patrick's decree.

To enter into a detailed description of this harmless, and, in gardens, most useful little Reptile, is quite superfluous; its croak, its mode of leaping and swimming, its bright eyes, and its colouring, are known to all.

The Frog hibernates, like all our Reptiles; passing the colder months of the year in a state of torpor, buried deep in the mud at the bottom of ponds, or sluggish streams. Here they congregate in multitudes, all huddled closely together, so as to form almost a continuous mass. Early in the spring they re-appear; and during the month of March the female deposits her eggs in the water. These may be seen floating in the form of large jelly-like masses, containing thousands of black points, or dots, the germs of the future tadpoles.

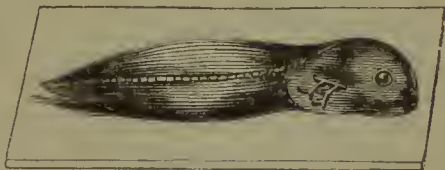
During summer, the active period of its existence, the Frog is very voracious, devouring the larger insects, and especially slugs, which are a favourite food; on this account, the Frog ought to find favour in the eyes of the gardener, and cultivator of culinary vegetables, to whom it is really and extensively beneficial; and therefore, instead of being wantonly and cruelly destroyed, it ought to be protected. Mr. Bell, with much good feeling, observes, that "this consideration ought, surely, to weigh, even with those who are inaccessible to the appeals of humanity, in favour of this harmless and much persecuted race." Let not our reader forget, that cruelty is a sin in the eyes of the pure and holy God, who has declared, that not a sparrow falls to the ground unnoticed by him.

The rapidity with which the Frog seizes its prey is so great, as almost to elude our eye. The tongue is the agent in this operation. When at rest, this organ is



doubled back upon itself, and concealed within the mouth ; its extremity is lubricated by a glutinous secretion, of a very adhesive quality. When the Frog sees its prey within the due distance, it darts its tongue at it with arrow-like velocity, touches it with the tip, withdraws the tongue into the mouth, and swallows the prey, secured by the adhesive matter. The whole action is instantaneous.

We have already said, that the black points, in the gelatinous eggs of the Frog, are the germs of the Tadpole, which is the immature young. This germ appears like a small pellet, or globular body ; and in a few hours after the eggs are deposited, a change in this germ is perceptible. The developement of the Tadpole now commences. Very soon, the head becomes prominent, and a flattened tail is produced ; while a projection on the side of the neck, at first scarcely visible, gradually shoots out into a few filamentous tufts, as seen in the annexed figure.



These float loosely, and serve for the oxygenation of the blood, by the air which the water itself contains. Minute holders near the mouth, by which the Tadpole subsequently attaches itself to objects for its support, are also developed. The mouth, however, is still small ; but first the nostrils, and next the eyes appear. The branchial tufts increase, and divide into lobes ; and the Tadpole, still confined in a curved position by the envelopes around it, now struggles to emancipate itself. This period is hastened or retarded by the temperature of the atmosphere. In Italy, according to Rusconi, the Tadpole becomes hatched within four days from the deposition of the egg ; but in our climate, in about a month, and often more ; that is, towards the end of April, the eggs having been deposited in March. The caudal fin is

now expanded, and the branchial tufts, two on each side, consisting each of about five leaves, arrive at their maximum. In these branches, the circulation of the blood, as seen through a microscope, is a most beautiful object of contemplation; the transparency of the parts renders every globule of blood distinct, as it is rolled along, through the arterics, up the stems and leaves of the branchiæ, and returned down the opposite side.

A change soon commences in the branchial tufts; they begin to diminish in size, and are at length so reduced, as to become shrouded in the form of true gills, four in number, on each side, beneath a little gill-cover. The eyes have now increased; the mouth has enlarged, and acquired moveable lips, which were previously wanting, and the holders are scarcely to be seen. The caudal web expands; and the active little Tadpole swims about in shoals, seeking sustenance, and enjoying the light. At this period, its food consists of decaying vegetable matter; but afterwards, of animal and vegetable substances indiscriminately. Before their ultimate change, these little creatures manifest unexpected ferocity, and kill and devour each other. Mr. Bell informs us, that, having reason to suspect this, he "placed in a large glass globe of water, several Tadpoles, more or less nearly approaching their final change; and he observed, that almost as soon as one had acquired its limbs, it was found dead at the bottom of the water, and the remaining Tadpoles feeding upon it. This took place with them all, successively, excepting the last, which lived on to complete its change, and for a considerable time afterwards."

The Tadpole now only increases in size; but in a few weeks, the hind legs begin to make their appearance, first beneath the transparent skin of the trunk, at the origin of the tail. These are succeeded by the fore legs, and their development goes on progressively, until they have acquired a degree of size proportionate to that of the body. During this period, the lungs have also become

developed, and the faculty of inspiring atmospheric air is acquired; for which the, as yet, aquatic animal may be observed to come to the surface, taking it in its mouth, and afterwards discharging it in the form of a round bubble below the surface.

The gills now begin to be obliterated, while the tail, less and less requisite for the purposes of locomotion, either aquatic or terrestrial, gradually shrinks by a process of absorption. It soon disappears, and the metamorphosis is complete.

The appearance and the habits of the animal have undergone an according change with the reversal of its physical constitution; and it is fitted either to leap among the herbage of the meadow, or swim in the water; the atmospheric air being its sole element of respiration.

Surely, the marvellous process we have briefly described, performed with unvarying precision, cannot be uninteresting to the thoughtful inquirer into the laws that regulate the condition of living beings; it bespeaks design and power, and leads us at once to the great source of life, the Maker of all things, who in his works of creation, no less than of grace, has surrounded us with mysteries.

The growth of the young Frog is now rapid, till the approach of winter, when it seeks its retreat. During the summer, multitudes of these little creatures are scattered over the meadows, and often so abundantly, in favourable spots, as to induce persons, from their sudden appearance, to suppose them to have been rained down from the clouds. While yet Tadpoles, they were the prey of fishes; now their hosts are thinned by the weasel, the snake, and by various kinds of waterfowl, which feed eagerly upon them. Very few, out of every thousand that are hatched, ever survive the summer.

All our readers are familiar with the account of the plague of Frogs, (Exod. viii.,) which came up out of the waters, the streams, the rivers, and the ponds, and

covered the land of Egypt, when Pharaoh refused liberty to the Hebrews. This miraculous visitation was ordered by God for a special purpose; but the astonishing numbers, both of these Reptiles and of young Toads, which sometimes appear suddenly in places, where none were previously seen, is not an uncommon occurrence. In our own country, in France, Italy, and various parts of the continent, such has often taken place; violent rains accompanying their sudden appearance; and it has been, and still is, popularly believed, that showers of rain, together with Frogs and Toads, are among the phenomena of nature. Accounts, by persons who have witnessed, as they thought, this strange occurrence, are abundant, and the subject has led to long controversies. "Naturalists," says M. Dumeril, "know that the sudden appearance of young Frogs, on the surface of the earth, and in places where they did not seem to exist previously, has, in all times, roused public attention and curiosity; the supposition being, that they had fallen from the sky. We find, in fact, traces of this belief in Aristotle, in some passages of Athenæus, and Ælian, and of the moderns in Gesner; in many volumes of the 'Ephemerides of the Curious Things of Nature;' in the works of Ray, and those of Redi. Elaborate discussions have been entered into on the subject. Cardan was vigorously attacked by Scaliger, for having given credit to this sort of spontaneous production. Pison thought that these Toads did not fall formed from the skies, but that they sprung from the animalizing action of the rain, on the clods of fertile earth. He was ably answered by Lentilius."

Redi, while he admitted the facts to a certain degree, proposed the following explanation. "These Toads and Frogs," he says, "do not appear until it has rained for some time; but these animals had been hatched many days previously, or, rather, having undergone their complete transformation, and had quitted the water in which they were developed as Tadpoles. These little Frogs then lay crouched and concealed in the chinks of the earth, under

stones and clods, wherc, in consequence of their lying motionless, and often, also, on account of their dusky colour, they escaped the eye." This is undoubtedly the truth; concealed in fissures and crevices, and exhausted by drought, they lay till the welcome rain restored them to animation, and invited their sudden appearance.

It has been, indeed, suspected, that sudden whirlwinds, sweeping into the air sheets of water and their contents, and then precipitating them on the earth, may account for the occurrence of these Reptiles as described, especially when they are found absolutely upon the clothes of persons exposed to the falling rain. We know not from what height a Frog can fall uninjured, but we should not like, were we a Frog, to be thrown from the monument of London, upon the ground. Dumeril concludes his observations as follows:—"Thus the precise period of the year, the circumstance of rain always preceding the appearance of those young Frogs and Toads, which bear the signs of their recent transformation, and, generally, the total absence of any violent commotion of the wind, leave us in no doubt as to their origin. We have ourselves, observed the phenomenon in question, once in Picardy, near Amiens, and once in the marshy meadows near Marbella, in Spain: in the latter case, it was a host of little Frogs that made their appearance, and covered our clothes, as M. Desgenettes, (now present at the scientific meeting,) may remember."

The Frog is not incapable of being tamed, as is proved by an anecdote, related by Mr. Bell, and for which he states himself to be indebted to Dr. W. Roots, of Kingston, who, he writes, "informs me that he was in possession, for several years, of a Frog, in a perfect state of domestication. It appears that the lower offices of his house were, what is commonly called, underground, on the banks of the Thames. That this little Reptile accidentally appeared to his servants, occasionally issuing from a hole in the skirting of the kitchen; and that during the first year of his sojourn, he constantly

withdrew upon their approach; but on their showing him kindness, and offering him such food as they thought he could partake of, he gradually acquired habits of familiarity and friendship; and during the following three years, he regularly came out every day, and particularly at the hour of meal-time, and partook of the food which the servants gave him. But one of the most remarkable features in his artificial state of existence, was his strong partiality for warmth, as during the winter seasons he regularly (and contrary to the cold-blooded tendency of his nature) came out of his hole in the evening, and directly made for the hearth, in front of a good kitchen fire, where he would continue to bask and enjoy himself till the family retired to rest.

“There happened to be, at the same time, a favourite old domestic cat, and a sort of intimacy and attachment existed between these incongruous inmates; the Frog frequently nestling under the warm fur of the cat, whilst the cat appeared extremely jealous of interrupting the comforts and convenience of the Frog. This curious scene was often witnessed by many besides the family.”

The tameness to which Toads can be brought, renders this account less extraordinary than it might at first appear. Of its truth there can be no doubt.

Mr. Bell separates, as a distinct species, a Frog found in Scotland, to which he gives the title of *RANA SCOTICA*; and which is certainly not the Edible Frog (*R. esculenta*) of France, and other parts of the continent, as some naturalists have supposed. It exceeds the Common Frog in size, and differs both from it, and from the Edible Frog, in the form of the skull. M. Bibron hesitates as to its distinctness from the Common Frog, of which, however, there can be but little doubt. It occurs in the neighbourhood of Edinburgh, and is, perhaps, to be found in our northern counties of England.

The EDIBLE FROG, (*Rana esculenta*), or GREEN FROG, as it is called, is a native of continental Europe, (the



north excepted,) some parts of Asia, and also of northern Africa. This species is essentially aquatic, inhabiting either running or stagnant waters. It is found, on the borders of rivers, and streams, lakes, ponds, and morasses, both fresh-water and saline, and in ditches, and even in small splashy places. Every where it prefers spots luxuriantly covered with vegetation, and especially where reeds and lotus plants grow, on the leaves of which, or on the verdant margin of the water, it delights to bask in the rays of the sun. On the slightest noise it leaps into the water, and buries itself beneath the herbage, or in the mud, soon, however, emerging, when it finds the danger past. Insects, aquatic mollusks, larvæ, and worms, constitute its food. During the summer, it may be caught with a line and hook, baited with a bit of scarlet cloth kept in motion, so as to appear as if alive. The croak of the male, continued night and day, during the summer months, is almost intolerable, where numbers abound.

On the continent, this species is in high request for its flesh, the hind quarters alone being used; the meat is delicate and well tasted. In Vienna, where the consumption of these Frogs is very considerable, they are preserved alive, and fattened in froggeries (*grenouillères*) constructed for the express purpose.

The Green, or Edible Frog, is subject to great variation of colouring. In general it is of a beautiful green, irregularly marked with black, or dark brown spots, and ornamented on the back with three stripes of a rich golden yellow: but in some these are absent.

America presents us with several Frogs of huge size, and sonorous voice, of which we may notice the BULL FROG, (*R. pipiens*, Harl.; *R. mugiens*, Catsby.) This Frog is three or four inches broad, and six or eight in the length of the head or body; and is one of the largest of the genus. It inhabits North America, more particularly Carolina, and seldom moves far from the

water, at the bottom of which it makes a hole or fissure for its retreat, and to which it has recourse when alarmed. According to Catesby, its croaking sounds like the bellowing of a bull, and is louder when uttered below the surface. During the summer, and on dry evenings, it makes a terrible noise. It is voracious and predatory, devouring insects, fish, and even snakes.

M. Bibron has found, in the stomach of five or six specimens, dissected by himself, insects of different orders, fresh-water shells, the remains of fishes, part of the skeleton of a siren, and the bones of birds. We know, in fact, that this Frog will swallow young ducks; and Dr. Harlan mentions having killed one in the act of swallowing a snake. It is said that the Bull Frog lives in pairs, and more than one or two are seldom found in a single pond or marsh.

Catesby's statement of the bull-like voice of this Frog is, probably, overcharged. Audubon simply says, its voice is louder than that of any other species, and may be distinctly heard at the distance of forty or fifty yards. He adds, "It is particularly fond of such small pure streams of water as are thickly shaded by overhanging bushes. It sits for hours, during the middle of the day, basking in the sun, near the margin of the water, to which it betakes itself by a great leap, at the least appearance of danger, diving at once to the bottom, or swimming to the opposite side. In the southern states, it is heard at all seasons, but principally during the spring and summer months. Its flesh is tender, white, and affords excellent eating. The hind legs, however, are the only parts used as food. They make excellent bait for the larger cat-fish. Some Bull Frogs weigh as much as half a pound. I have generally used the gun for procuring them, shooting with very small shot."

The West Indies and South America present us with a huge Frog, (*Rana ocellata*, Linn.; *Cystignathus ocellatus*, Wagler,) which closely resembles the former

in manners and habits; it is, also, commonly called Bull Frog (a general name of species of large size and sonorous voice) by the English; the French improperly name it *Crapaud*. It inhabits shady swamps, and humid places; and does not quit its retreat till night. It leaps with amazing strength, and can clear a wall of five feet in height. During the dry season it is very torpid, and keeps close in its hiding place; but when the rains set in it resumes its activity. In the Antilles, these Frogs are reared in a state of domestication for the use of the table, and are said to become familiar. It is the *Rana gigas* and *R. pachypus* of Spix.

The WATER FROG, or SHAD FROG, (*Rana halecina*, Kalm,) is found in the United States. It is extremely alert, and when pursued, will make leaps of eight to ten feet in length; it inhabits humid places, and borders of fresh-water pools.

Many other Frogs are found in America; as the *R. clamitans*, *R. typhonia*, *R. labyrinthica*, etc. India and Africa have also their respective species; but in Africa, the number of species is very limited, amounting only to eight; a fact to be explained by the physical characters of the country.

#### GENUS CERATOPHRYS.

Separated into a distinct genus, is a small group of American Frogs, with a large head, with granular or tuberculous skin, and with the edge of the upper eyelid prolonged into a point, resembling a horn. The genus is termed Ceratophrys. One of the species, (*C. dorsata*), found in Cayenne and Brazil, has a buckler on the back, formed by the junction of several bony plates, which are developed in the substance of the skin; these plates are independent of the rest of the skeleton.

The BUCKLERED HORNED FROG (*C. dorsata*) inhabits deep and humid forests, or marshes, embosomed in trees;

but it is sometimes found in cultivated places. It leaps vigorously; and utters, towards evening, a monotonous croaking. Length of head and body about eight inches.

BOIE'S HORNED FROG, (*C. Boiëi*), which is a native of Cayenne and Brazil, is not larger than our Common Frog.

#### GENUS PSEUDIS.

The genus *Pseudis* contains the JACKIE, (the *Paradoxical Frog* of Shaw, or the *Frog-fish* of Edwards; *Pseudis merianæ*, Bibr.; *Rana paradoxa*, Linn.) It is a native of Guiana. Of all the Frogs, the Tadpole of this attains the largest size; nevertheless, the matured Frog is very small. To the body of the Tadpole is attached a large and broad tail, and the whole contour of the creature is very fish-like. Hence arose the popular belief, promulgated by the first observers of this species, and among them Madame Mérian, that the Frog in question became, in due time, transformed into a 'fish.' The fact is, that this 'fish' is a Tadpole, which is about to be transformed into a Frog; and the loss of an enormous tail, and of the envelopes of the body, renders the adult Frog a much less animal than it was while in its imperfect condition. The male has a large vocal sac under the throat. Its manners are those of the Frogs in general.

#### TREE FROGS.

The Tree Frogs now claim our notice. Of all Reptiles, we should least expect to find Frogs of arboreal habits, and capable of leaping like birds among the branches. We find, however, a numerous group (*Hyla*) endowed with a structure which fits them for their leafy abode. The Tree Frogs are beautiful creatures, both in form and colouring; and their habits give them additional interest. They perch upon the leaves; they leap from leaf to leaf, from branch to branch, and

imitate the actions of a bird. There they pursue their insect prey with astonishing agility, and enjoy the cheering warmth of summer. The mode in which they are qualified for their arboreal habits yet remains to be explained. The monkey, as we know, grasps with its paws the perch on which it rests; the bird with its claws; the snake twines itself around the branch; the iguana uses its long toes and hooked nails; the chameleon holds the bough tight between its vice-like toes; but the foot of the Tree Frog acts differently from the foot of these animals: it is not a grasping organ, nor is it furnished with claws for clinging; but it is provided with suckers, analogous to those we have noticed in the foot of the gecko; and, in this particular, it is dissimilar from that of the ordinary species. On the under surface of each finger, (both of the fore and hind paws,) at the tip, which is enlarged and rounded, is placed a sucker, consisting of a little cushion, moist with a thick glutinous fluid, and applying itself so closely to the surface it touches as to support the creature's weight. This mechanism, is, however, under the animal's control, as it can disengage or fix its fingers at will. In the Common Frog, and its immediate allies, nothing like this is to be seen. The Tree Frogs, *Hyla*, differ besides, as we may here notice, from the genus *Rana*, in the greater length of the hind legs, and in the circumstance of the males possessing a membranous sac beneath the throat, which is distended while they are uttering their hoarse and oft-repeated croaking.

#### GENUS HYLA.

Of this genus, which is spread over the warmer portion of the old and new world, one species is a native of Europe. It is the COMMON TREE FROG, (*Hyla arborea*,) one of the most beautiful and interesting of the group. In Sardinia it is very common, and it is not unfrequent in other portions of the south and south-

eastern districts; it is also found in northern Africa. The vigour and agility which distinguish the Common Frog, are qualities still more remarkable in this curious little creature, which is as far inferior in size to its terrestrial relative, as it excels it in the clearness and beauty of its colouring. The upper surface of the body is of a fine green; the under surface white; a yellow stripe bordered with pale violet stretches along the sides of the head and body, and down the hind legs to the feet, while a similar stripe branches off, and extends down the arms to the fore feet. The head is short, but large; the muzzle is rounded; the eyes are bold and prominent; the body is short, and of a triangular figure; the toes of the paws, or anterior feet, are four in number, short, and stout; those of the hind feet are five, and are long and slender; the interdigital webs are only partially developed; the hinder limbs are long. The alertness and agility which the Tree Frog displays, are truly astonishing. Catesby affirms, that it has been known to clear an interval of twelve feet; but this is, perhaps, only done when the animal takes a descending leap from one branch to another obliquely below it; still, with every allowance, the leaps which this animal takes are surprising, not only from their extent, but from their address and precision. It is in the midst of the woods, among the foliage and branches of the trees, that the Tree Frog passes the greater portion of the summer; so adhesive are the gelatinous cushions of its toes, that, however smooth and polished the surfaces may be on which it rests, they affix themselves intimately to them; nay, it matters not whether the creature adhere to the under or upper surface of a leaf; in either place it is alike secure. All the summer long, in the warm and sunny regions of the south, may this little animal be watched among the leafy woods, engaged in the pursuit of various insects, darting after them as they pass within the distance of its spring; it seizes them with its



glutinous tongue, and rapidly draws them into its mouth, in the same manner as the Common Frog; and having swallowed one insect, it darts at the next that flits by. This restless activity, this unceasing repetition of leaps, not unlike the short darting flights of a bird, from leaf to leaf, or from bough to bough, have induced some to compare it to the fly-catcher, (*Musicapa grisola*,) which takes gnats and flies much in the same manner, by an abrupt attack upon such as pass near its perch of observation. But the Tree Frog does more; it lurks under the leaves of the highest branches, and seizes such unwary moths or flies as settle within the reach of its tongue, which it can launch out to a considerable distance. Well may Lacépède observe, that the unfavourable opinions, which many very foolishly entertain with regard to the Common Frog, will not be brought against our little favourite. Its fine rich tints, which blend with the green of the leaves, and the enamel of the flowers, at once give it interest; but when we watch its stratagems and ambuscades; when we mark it chasing its tiny prey; when we see it dart to the distance of many feet, pitch upon the leaves, and, in whatsoever situation they may hang, there adhere and settle in a way which, did we not know the secret, would appear marvellous—are we not as much pleased and delighted in our observations of so novel and unexpected a train of actions, as in a consideration of the plumage, and the manœuvres and flight of birds?

We must not suppose that the Tree Frog passes the whole of its existence on the trees. On the contrary, like the rest of its race, it commences its existence as an aquatic animal; and when adult it visits the water to deposit its eggs: it also hybernates in the mud at the bottom of lakes and marshes.

It is usually towards the end of April that the Tree Frog quits its leafy abode among the trees, in order to deposit its eggs in the water of the neighbouring marsh;

for it is in the proximity of such places that this animal is most abundant. Numbers are now collected together for the same great purpose, the males being conspicuous by the distension of their throat, which assumes a tint of brown, and by their loud, hoarse croakings, which exceed in vehemence those of the notes of the Common Frog. The first croak uttered, is the signal of a general concert of discordant voices. So astounding is the clamour, that, at a distance, it might be taken for the cry of a pack of hounds in full chase; and, during the tranquillity of a calm evening, or in the stillness of night, the din of their united voices may be frequently heard at the distance of a league, especially on the approach of rain. The fine green colour of the Tree Frog is not perpetual; after the breeding season the animal becomes of a reddish brown, which soon changes to gray, mottled with reddish; the colour next assumed is blue, and this again changes to green, which is the summer tint.

After the young are hatched by the heat of the sun, as is the case with the Common Frog, they remain in their Tadpole state for about two months, swimming in their native element, the water, and feeding on small insects and worms. When their change is complete, that is, when the tail and gills have disappeared, and the lungs and limbs have developed themselves, the little creatures, full of activity, and guided by unerring instinct, leave the water, and make their way to the adjacent woods, there to join their parents among the foliage. Swarms of these young Frogs are occasionally seen, leaping, like flocks of minute birds, among the bushes and trees which border the lakes and marshes of their favourite districts. The Tree Frog is slow in acquiring its full growth, which does not take place till the fourth year; nor does it breed before this period.

When the summer closes, and the autumn sets in, warned by the failure of its insect food, and the chillness

of the atmosphere, the Tree Frog prepares for its winter repose. Unlike the bird, which it imitates in its arboreal habits, it cannot migrate to a hotter, or more southern clime; but, like the Common Frog, and various other Amphibia, it hybernates; not suspended from the trees, or in holes, as the bat; nor in warm little nests, as the dormouse; but in the deep mud of the marsh or lake. To the water, then, a second time, does the Tree Frog retire: in it plunges, and buries itself in the soft mud at the bottom; where it tranquilly sinks into a state of torpor, in which the functions of life are suspended. Thus the winter months are passed, till spring returns, and re-animates the face of nature; then it again makes its appearance, and seeks the fresh foliage of the trees.

The agreeable colours and sprightliness of the Tree Frog occasion it, not unfrequently, to be kept in cages, hung up in rooms, and, provided the temperature be suitable, and its food be such as it naturally takes, it will live without much difficulty. After death, the green of the upper surface is frequently observed to change into blue.

Among the foreign species, one of the most remarkable is the *HYLA TINCTORIA*, or *Rainette à tapirer*, as it is called by the French naturalists, a native of the woods of South America, and so named from the effect which its blood is said to produce upon the plumage of parrots. We are informed, that when the natives have discovered a green parrot's nest with young ones in it, they are accustomed to pluck away patches of the feathers of the birds, and rub on the denuded spots a portion of the blood of this Frog; and that the feathers, which spring up after this operation, are of a bright scarlet, so that the bird, when fully fledged, is party-coloured, bright red and green, instead of being in its natural dress. Though we doubt the effect of this operation as to the result above stated, notwithstanding the testimony of writers of credit, we

have seen this intermingling of red on the plumage of green parrots from South America, and have been always induced to regard it in the light of accidental variation. In Buffon's "History of Parrots," several plates illustrate this remarkable variation, which is not of very uncommon occurrence; and the circumstance as detailed, of the property of the blood of the *Hyla tinctoria* in effecting this change, is noticed by him in that work. Cuvier, in his "Regnè Animal," alludes to the same reports, but guards himself from asserting it, by saying that it is stated to be so, it is an "on dit."

Another species, the *HYLA LATERALIS*, is a native of Carolina; it is usually found attached underneath the green leaves of trees, which serve to conceal it both from birds of prey and snakes, its principal enemies. This Frog is often found in extensive troops, and their croaking resounds to a great distance, especially during the night, when they maintain an almost incessant clamour. It leaps with great activity, and ascends even to the top of the highest trees in pursuit of insects.

We may conclude our sketch of the Tree Frogs by observing, that the genus *Hyla* is greatly subdivided by modern naturalists. Dumeril and Bibron, in their "Erpétologie Générale," have established sixteen genera, or subgenera, founded upon characteristics of minor importance. These genera comprehend sixty-four species, of which one is common to southern Europe, Asia, and Africa; five are restricted to Africa; eight to Asia; thirty-seven to America; ten belong respectively to Australia, Java, New Guinea, Timor, and adjacent islands. Of three species, the country is unknown. Throughout all these species, as far as observations extend, a similarity of habits prevails.

## TOADS.

Cuvier distinguishes the Toads as having an inflated body, the skin warty or tuberculous, and a tumour of variable size behind each eye, consisting of a gland, from the pores of which exude an unctuous and offensive fluid. There are no teeth; the hind limbs do not much exceed in length the fore pair. They crawl rather than leap, and when their transformation from the Tadpole state is accomplished, they retire from the neighbourhood of the water to dry situations. Their saliva is popularly supposed to be venomous, but this is one of many common errors.

The COMMON TOAD (*Bufo vulgaris*) is familiar to all our readers. There is, perhaps, no Reptile on which such reiterated abuse has been lavished, as on this harmless and useful creature; and even naturalists, professing to rise above vulgar feelings and prejudice, and to observe nature with an enlightened understanding, have joined the common outcry. Lacépède, while he praises the Frog for its light form, its nimble movements, its graceful attitudes, and its lively gambols, attributes to the Toad "revolting habits, disgusting qualities, and dangerous properties." We are tempted to ask, Did a naturalist pen such absurdities? Even Pennant writes in the same tasteless strain. "It is," he says, "the most deformed and hideous of all animals; the body broad; the back flat, and covered with a pimply, dusky hide; the belly large, swagging and swelling out; its pace laborious and crawling; its retreat gloomy and filthy; its general appearance, in short, such as to strike with horror and disgust." A pretty character, truly! We will not attempt to describe the external form of the Toad, for all know it; but we will sift its qualities, and see how far it merits such opprobrium. We do not say, that "the Toad, ugly and venomous, yet wears a

precious jewel in its head ;” for we know it wears no jewel, unless its brilliant eyes be termed gems, a figure which poetry would sanction ; and we have already said it is not venomous. As for being ugly, some may, perhaps, think the contrary. We should not gainsay them. At all events, there is much in the habits of the Toad to interest us, and it has been kept domesticated.

We have said that the Toad is not poisonous. There are, however, glands on the skin of the back and sides, which pour out an acrid fluid, capable, perhaps, of producing irritation on a very sensitive skin, and certainly intended as a defence. More than once have we seen our own dog seize a Toad, which it has immediately dropped, its mouth becoming rapidly filled with an abundance of frothy saliva ; while its mode of shaking its head, and its endeavours to clear away the saliva, proved its mouth to be smarting, or unpleasantly affected. We thus confirm Dr. J. Davy in his opinion as to the intention of this acrid juice, which he regards as a safeguard against the attacks of carnivorous animals.

Few, perhaps no, Reptiles are more easily rendered familiar than Toads : in a little time, as we can attest from personal experience, they will come out of their holes, and sit quietly to take small slugs presented to them. This they do like the Frog, and with so rapid an action of the tongue, that it almost eludes the eye. We once had a small colony of Toads tenanted the rough wall of an old terraced garden ; they would put their heads and half their bodies out of their hiding places, and receive, in the most familiar manner, their food : this we regularly, for two summers, were accustomed daily to give them, collecting slugs for their supply. Mr. Bell had a tame Toad, that would sit on one hand, and eat from the other : and the story of Mr. Arscott’s Toad, which lived in his family for thirty-six years, when



it was killed by accident, is well known. In gardens and nursery grounds, there is not a more useful animal; they do not require humid situations like the Frog, but are at home in the most arid spots. In addition to slugs, they feed upon caterpillars, beetles, and worms. When the worm, from its length and writhing, proves an inconvenient morsel, the Toad pushes the creature into its mouth by means of its fore paws, till the whole disappears.

The Toad, like all the Reptilia and Amphibia, yearly sheds its cuticle, or scarfskin, a new one of brighter tints being prepared beneath. The manner in which the present animal effects its liberation from its old dried garment, was first correctly determined by Mr. Bell, from personal observations. "Having often found," he says, "among several Toads, which I was then keeping, for the purpose of observing their habits, some of brighter colours than usual, and with the surface moist and very smooth, I had supposed that this appearance might have depended on the state of the animal's health, or the influence of some peculiarity in one or other of its functions. On watching carefully, however, I one day observed a large one, the skin of which was particularly dry and dull in its colours, with a bright streak down the mesial line of the back; and on examining farther, I observed a corresponding line along the belly. This proved to arise from an entire slit in the old cuticle, which exposed to view the new and brighter cuticle beneath. Finding, therefore, what was about to happen, I watched the whole detail of this curious process. I soon observed that the two halves of the skin, thus completely divided, continued to recede farther and farther from the centre, and become folded and wrinkled; and after a short space, by means of the continued twitching of the animal's body, it was brought down in folds on the sides. The hinder leg, first on one side, then on the other, was brought forward under the arm, which

was pressed down upon it, and the hinder limb being withdrawn, its cuticle was left inverted under the arm. That of the anterior extremity was then loosened, and at length drawn off by the assistance of the mouth. The whole cuticle was thus detached, and was now pushed by the two hands into the mouth, rolled in the form of a little ball, and swallowed at a single gulp."

The Toad, like the Frog, deposits its eggs in the water, two or three weeks later than the latter. In August, the Tadpoles, having completed their transformation, leave their native element for the land, dispersing themselves in all directions.

Toads are nocturnal animals; evening and night are the principal seasons of their activity, at which time their favourite prey, the slug, also creeps abroad. An evening shower after a hot day, will draw them out from their lurking places in abundance. During the winter, the Toad hybernates, seeking a hole in the ground, the interstices of crumbling walls, or other similar retreats, in which to pass away, in tranquil repose, the months of cold. In the spring it emerges from its dormitory, and seeks the water, where its loud croak may be heard at a considerable distance. After the deposition of the eggs it returns to the land.

We have all heard of Toads being found imbedded in solid masses of stone, and in the heart of trees. Instances of this kind have been so asserted and supported by testimony, that some degree of credit attaches to them, though not to the extent popularly given. Experiments have been made with a view to try the power of endurance possessed by the Toad, when immured in a close prison. M. Herissant, in 1777, shut up three Toads in sealed boxes in plaster of Paris, and they were deposited in the Academy of Sciences. At the end of eighteen months, one of the Toads was dead, the other two were living. We cannot doubt but that air pene-

trated through the plaster, compact as it is. In 1817, Dr. Edwards proved that Toads, imbedded in plaster, lived a great number of days, and much longer than Toads forced to remain under water. Toads imbedded in plaster, and then placed under water, speedily perished. It would seem, then, that accident must have introduced the Toads in question, while yet very young, into the prisons in which they have occasionally been found; and that, by the closing of the orifice which originally admitted them, they have become immured for an indefinite period, perhaps many years; sufficient air and moisture reaching them, for the support of the system in a sort of torpid condition; but yet not so torpid as to prevent a certain degree of growth. To suppose, however, that Toads, thus discovered, are hundreds of years of age, coeval with the rock around them, or the tree which incloses them, is absurd. It is to be observed, moreover, that the facts detailed in public prints, relative to these occurrences, depend upon the testimony of insufficient observers, of persons fond of the marvellous, and that their testimony has yet to be sifted. How much of the marvellous would not a little strict investigation destroy!

Besides the Common Toad, we have, in our island, the NATTER JACK TOAD, (*Bufo calamita*,) which is very common in certain localities. It is found on Blackheath, and about Deptford, in various places in Cambridgeshire and Norfolk, on the coast of Solway Frith, and elsewhere. It is abundant in France and Germany. The colour of this Toad is of a yellowish or olive brown, with a bright yellow line along the middle of its back. Dry spots are its favourite haunts; but the water is its breeding place. It is less sluggish and crawling in its motions than the Common Toad; and will even run, though very awkwardly, for a short distance.

There are several species of Toad found in Europe,

which are not natives of our island ; as the *Bufo bombinus*, which gives preference to marshes and stagnant waters in the south : the *Bufo obstetricans*, common in France ; the male of this species carries about with it, entwined round its limbs, the eggs which the female has deposited, until the Tadpoles are nearly ready for exclusion, it then seeks the water, and there leaves them. The *Bufo spinosus* is also found in France, especially in the hilly districts ; it is covered with tubercles, terminated by a blunt horny spine. In its habits this Toad is very remarkable ; it is never met with on the surface of the soil, and can only be procured by ploughing or digging. Dandin supposes that it deposits its eggs in the ground, either in humid places, or in the subterraneous sources of streams.

#### GENUS PIPA.

The genus *Pipa*, separated by naturalists from *Bufo*, presents us with the SURINAM TOAD, called *Tedo* and *Curucu* by the natives. It is from six to eight inches in length, and four or five in breadth. The skin is of a dirty brown colour, thickly studded with reddish tubercles. The female has the back pitted with a great number of small cells, and in these the male carefully places the eggs which she has deposited : this done, she repairs to the water ; the skin of the back now swells, the pits deepen, and in due time the Tadpoles appear ; there they pass their Tadpole state, and do not emerge till they have lost their tail, and their limbs are developed. The female then returns to land. This Toad is not unfrequently found in houses. According to Seba and Madame Merian, the negroes eat its flesh. The male is distinguished by an enormous larynx, formed like a bony triangular box, within which are two moveable bones, capable of closing the entrance of the tubes of the wind-pipe. This structure influences the voice.

## NEWTs.

Leaving the frogs and toads, we now come to the Newts, or Efts, of which some species are terrestrial, visiting the water only during the breeding season, while others make it their permanent, or nearly permanent, abode. The Tadpoles, or young of the Newts, undergo a transformation resembling, in all essentials, that of the Tadpoles of the Frog, with this exception, that the tail merely changes its form, and is never lost. In their contour these Reptiles are lizard-like. The jaws are furnished with minute teeth, and a double row extends down the palate.

## GENUS SALAMANDRA.

The genus *Salamandra* comprehends the terrestrial Newts. The tail, when the animals are adult, is round and tapering; on each side of the head there is a gland, similar to that of toads.

The COMMON SALAMANDER, or LAND NEWT, (*Salamandra maculosa*,) has been celebrated from the earliest time. This Reptile is very common in France and Italy, and other continental regions. In Gascony it is termed *Myrtil*; in Savoy, *Pluvine*; in Maine, *Un sourd*. It was this little harmless Reptile, to which the ancients attributed the most wonderful powers; itself with a body of ice, it inhabited the flame, as its natural element, uninjured by the strongest heat, which it could even extinguish; its bite was deadly; and, while confident in itself, it braved every danger. It was, indeed, at once an object of terror and astonishment. These childish errors have vanished, and we now see in the Salamander no marvellous properties, no miraculous endowments, and we examine it without fear.

This Reptile frequents humid places, and takes up its abode in the soft ground, among decayed trees in wooded

districts, in ditches and shady spots, in caves and ruined buildings. Its colour is black, spotted with bright yellow; and on its sides are ranges of tubercles, from which, in times of danger, a milky fluid oozes, and is sometimes projected to the distance of several inches; this fluid is acrid, and of a powerful odour, and is said to be fatal to very small animals. In the exudation of this fluid, we have a key to the errors of the ancients respecting this Reptile; but we cannot help smiling at Pliny, who states, that by infecting with this poison all the vegetables of a vast extent of territory, it could spread death around, like a pestilence, and depopulate nations.

Sluggish, inert, and slow in its movements, the Salamander is, at the same time, timid and retiring; it is impatient of the heat of the sun, and seldom quits its retreat, except during rainy weather, and at night: it has nothing of the quick perception and liveliness of the little lizard, and seems to be unaware of impending danger. The courage, for which it was renowned, is mere stupidity. Flies, worms, slugs, etc., are its food.

According to Gesner, these Reptiles pass the winter in a sort of burrow underground, numbers assembling together, and intertwining themselves for the sake of mutual warmth. The Salamander produces, like the viper, its young alive, these having not only been hatched, but having undergone their change previously to their birth; the tail, however, is flattened at the sides. Forty or fifty are the produce, at the same time, of a single female; their colour is of a uniform black.

Though tenacious of life, a little salt or vinegar thrown on the Salamander, produces convulsions and death.

In the Alps, a distinct species, the BLACK SALAMANDER, (*S. atra*,) is found; and in the Appennines, the SPECTACLED SALAMANDER, (*S. perspicillata*.) There are





COMMON WATER-NEWT.



other species also European; and Asia and America possess their own respectively.

### AQUATIC NEWTS.

The aquatic Newts (*Triton*) are distinguished by the tail being always flat at the sides, and by the absence of parotid glands on the sides of the head. The body is covered with warty tubercles. These Reptiles pass almost their entire existence in the water; they are remarkable for the facility with which they reproduce the limbs or tail, when cut off, and that several times in succession.

The males, during the breeding season, are distinguished by a high membranous crest along the back, and a second along the upper ridge of the tail; these crests subsequently diminish. The limbs are short and feeble, and aquatic progression is produced by the paddle-like action of the tail.

Four species are natives of the pools, ditches, and still waters of our own island. Of these the largest is the COMMON WATER NEWT, (*Triton cristatus*.) (See engraving.) This species is about six inches in length; it frequents deep ditches in moist meadows, and large pools; it feeds on aquatic insects, the Tadpole of the Frog, and even the smaller species of Water Newts, which it seizes and holds fast with determined ferocity. Early in the spring, the crests of the male become expanded, and that of the back deeply notched at its edge.

The manner in which the female deposits her eggs is very singular, and was first published by Rusconi, whose account Mr. Bell has verified. Cuvier, however, was not aware of it. "The female," observes Mr. Bell, "selecting some leaf of an aquatic plant, sits, as it were, upon its edge, and folding it by means of her two hinder feet, deposits a single egg in the duplicature of the folded

part of the leaf, which is thereby glued most securely together, and the egg is thus effectually protected from injury. The manner in which this is effected is highly interesting, and may readily be observed by any one, as the animals are sufficiently common in many ponds and ditches, and may generally be easily obtained by means of a minnow net. In the neighbourhood of London especially, they are to be found in numbers every spring, and I have had no difficulty in procuring as many as I wished for the purposes of observation." It is during the months of May and June that the female deposits her eggs. In due time these are hatched, and the Tadpole, with fringed gills, swims actively about. Towards the close of autumn, the Tadpole loses its gills and its fish-like appearance, and acquires its perfect condition. It soon prepares to hybernate, and remains torpid during the winter, buried in the soft mud below the water.

The STRAIGHT-LIPPED WATER NEWT, (*Triton Bibernii*, Bell,) has hitherto been confounded with the preceding species, from which, however, it is distinct. Its habits and manners are the same.

The SMOOTH NEWT, (*Lissotriton punctatus*, Bell,) is the representative of a sub-genus, separated by Mr. Bell from Triton, in consequence of the smoothness of the skin, and two patches of pores on the head. The Smooth Newt is of small size, and is common in all our clear ponds and ditches. In its habits and manners it resembles the larger Newts; but is more terrestrial, both the adults and the young, after their transformation, creeping amongst damp herbage, or the decayed roots of trees, and even venturing into damp cellars. We have collected numbers of this species, both young and adult, in our own cellar, which was often flooded during heavy rains, or high tides in the river Thames; in addition to these Reptiles, toads also were plentiful. In



GIGANTIC SALAMANDER.





consequence of finding both young and adults at some distance from water, Shaw concluded that this species was altogether terrestrial; but he was in error, and had not sufficiently studied the habits and changes of these Reptiles. This little creature, generally termed Eft,\* is ignorantly, but very commonly, supposed to be poisonous, a most unfounded accusation.

A larger species, the PALMATED SMOOTH NEWT, (*Lissotriton palmipes*,) is distinct from the preceding. The grounds of distinction rest upon certain minutiae in the form of the mouth; besides which, a short membrane at all times fringes the toes of the latter.

America possesses many species of Triton; they agree in habits with the rest of the group.

#### GENUS MENOPOMA.

The genus Menopoma, of Harlan, next requires our notice. This genus is represented by that extraordinary animal, the GIGANTIC SALAMANDER of the United States of America, (*M. alleganensis*, Harl.;) (see engraving,) called, also, Molge, Ground-puppy, etc.

The limbs of this Reptile are strong; there are teeth in the jaws and palate; the eyes are distinct; no branchiæ have ever been discovered; but it is not improbable that they may exist at an early period, as in the common terrestrial Salamander, of which the young undergo their change before birth. There is an orifice on each side of the neck. The tail is flattened at the sides. This animal inhabits the rivers and great lakes of the States. It attains to the length of nearly twenty inches, and is of a blackish colour. Little is known as to its habits.

#### GENUS AMPHIUMA.

The genus Amphiuma is allied to the latter. No branchiæ have yet been found; but an orifice exists on each side of the neck. The body is extremely long, and

\* *Asker*, in the north and midland counties.

covered with a smooth skin, which together with its elongated form, give it an eel-like appearance. The limbs are extremely minute, and divided in one species into two, in another into three, little jointless toes. There are no ribs, and the vertebræ are fish-like. There are teeth in the palate.

The THREE-TOED AMPHIUMA inhabits Louisiana, and is found in recent alluvial deposits, and often under decayed trunks of trees ; it attains to the length of three feet.

The TWO-TOED AMPHIUMA (*A. means*) (see engraving) is found in Georgia, Florida, and South Carolina. It is capable of living on the dry land ; but how long has not been ascertained. "An individual," says Dr. Harlan, "in the possession of Dr. Mease, escaped from the vessel in which it was confined, and when found several days afterwards, was brisk and lively ; and I am informed by Major Wace, that they are sometimes discovered two or three feet under mud, of the consistence of mortar, in which they burrow like worms, as was instanced in digging near a street in Pensacola, when great numbers (hibernating) were thrown up during the winter season. It is called in Florida, *Congo snake* by the negroes, who believe it to be poisonous, but without foundation." It is about eighteen inches in length.

A gigantic Salamander, inhabiting the waters of Japan, and allied to the Menopoma, was lately living at Leyden. It had not the branchial apertures, which are found (but without gills) in Menopoma ; still it is not impossible that branchiæ might have existed at some period of the creature's life. M. V. der Hoeven has given to this extraordinary Reptile the name of *CRYPTOBRANCHUS JAPONICUS*. For some observations on it, see "Proceedings of the Zoological Society for 1838," p. 25.



TWO-TOED APHISMA.



## II. PERENNIBRANCHIATE AMPHIBIA.

Perennibranchiate Amphibia; that is, Amphibia which, though they acquire lungs, do not lose the gills, or branchial fringes; continuing, as it were, in a permanent Tadpole state, by an arrest of farther development.

## GENUS PROTEUS.

The first genus we shall notice under this section, is that termed Proteus, of which one species, *PROTEUS ANGUINUS* is known. (See engraving.)

Few Reptiles have excited more interest than this curious species; one of the links between air-breathing Amphibia and fishes. Its branchiæ are not, indeed, covered, as in fishes, but are exposed, and form a beautiful pink-coloured tuft on each side of the head. The body is eel-like, as are its movements; the tail is compressed; the eyes are rudimentary beneath the skin; the jaws are furnished with minute teeth. The limbs are very small and feeble, and almost useless; the toes before are three; and there are two on each limb behind. The skin is smooth and delicate. The abode of the Proteus is not a little singular. It is a dweller in subterranean water, where no ray of light penetrates: light, indeed, is too high a stimulus for the skin of the creature to bear with comfort; and hence, its eyes are merely small black dots beneath the skin, and in the lowest rudimentary condition. It is only in one limited district that the Proteus is found. At Adelsburg, in the duchy of Carniola, belonging to Austria, there is one of the most romantic and splendid caverns in Europe; it is commonly known by the name of the Grotto of the Maddalena. The whole of this part of the country consists of bold rocks and mountains, of limestone formation, full of subterranean caverns, containing lakes, and vast reservoirs of water, hundreds of feet beneath the surface

whence many rivers take their secret origin. These subterranean waters communicate with and supply a small lake in the celebrated cavern we have alluded to; and it is in this lake, where no sunlight ever enters, inclosed by barriers of piled up rock, deep in the bowels of the earth, that the Proteus is found, reposing on the soft mud, precipitated by the fluid, and lining the rocky basin. It has, also, though rarely, been noticed at Sittich, about thirty miles distant, "thrown up by water from a subterraneous cavity." The waters of the cavern at Adelsburg, must not, however, be supposed to teem with Protci; their occurrence is uncertain, (for they are not bred there,) and depends upon casual circumstances. In dry seasons, for example, according to Sir H. Davy, they are seldom found, "but after great rains they are often abundant:" and he adds, "I think it cannot be doubted, that their natural residence is in an extensive, deep, subterranean lake, from which, in great floods, they sometimes are forced through the crevices of the rocks into this place, where they are found; and it does not appear to me impossible, when the peculiar nature of the country is considered, that the same great cavity may furnish the individuals which have been found at Adelsburg and Sittich." This animal has been taken of various sizes, from the thickness of a quill to that of the thumb; the length of a moderate-sized individual is about a foot; the tail is compressed laterally, like that of an eel, and is used in the same manner in swimming. The head is elongated and depressed; the mouth is wide, and furnished with numerous teeth, whence we may conclude the animal to be carnivorous in its propensities; but what its food truly consists of, and how it procures it, are beyond conjecture. We have known several kept for months in a vessel of water, without apparent food, and in perfect health and vigour. The skin is of a pale flesh colour; but when the animal is removed from its native situation, and exposed to





PROTEUS ANGUINUS.



light, it assumes a darker tint, approaching olive brown; and the branchial tufts become deeper. The light, however, is evidently distressing, and the animals are glad to creep beneath the shelter of any substance which may serve as a protection from its influence. For some time after its first discovery, the *Proteus* was supposed to be the larva, or Tadpole of some unknown animal, inhabiting the deep subterranean cavities, and whose form it would finally assume, as the common Tadpole of our ponds becomes the Frog. This idea is now abandoned; its true character has been made out by observation and anatomical research, and its relative situation in the chain of animated beings ascertained: still, as it regards many points in its economy, we are yet in the dark.

On looking at the *Proteus*, and reflecting on its mysterious nature, on its dwelling, so apparently unsuited for the existence of such a being, on its adaptation to the circumstances in which it is placed, we cannot but trace the hand of God, who hath fixed for every thing the bounds of its habitation, and organized every thing so that it shall fulfil its allotted destiny.

#### GENUS MENOBRANCHUS.

The genus *Menobranthus*, of Harlan, may next be noticed.

The body is here moderately elongated; the tail deep, and flattened at the sides; the head flat; the branchial tufts large. The limbs are four in number, and moderate. The jaws and palate are furnished with small teeth. The toes are four on each foot.

The *MENOBRANCHUS LATERALIS* (see engraving) inhabits the great lakes of the Ohio and their tributaries; and attains, sometimes, to the length of three feet.

The *MENOBRANCHUS TETRADACTYLUS* is a distinct species. Of these singular creatures the habits are little known.

Dr. Harlan refers the Axolotl of Mexico to his genus *Menobranchus*; and, perhaps, correctly; but the toes are four before, and five behind. There are three long gills on each side in the form of tufts.

The AXOLOTL, (*Siren pisciformis*, Shaw; *Menobranchus pisciformis*, Harl.) is a native of Mexico; and common in the lake, out of which rises the city of Mexico itself. It is found in the coldest mountain waters, according to Humboldt, who, in his "Observations de Zoologie," has entered into minute details of its anatomy.

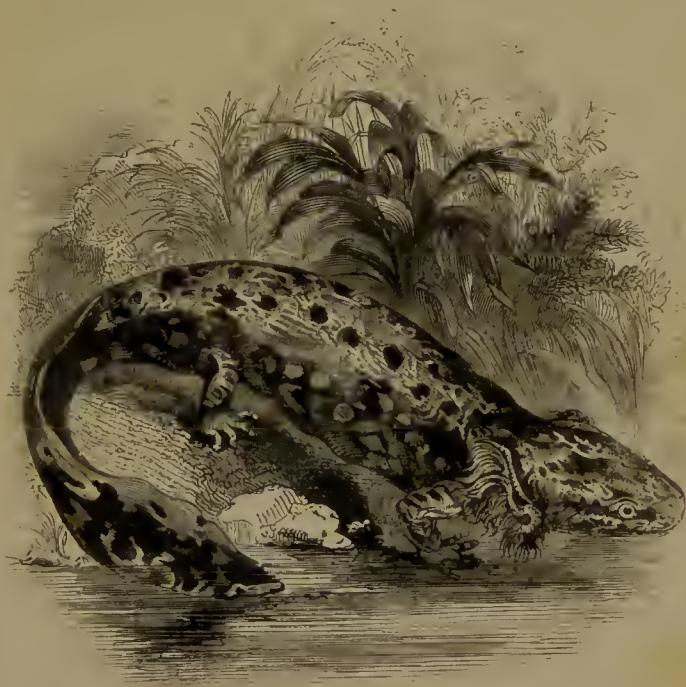
The engraving will convey a correct idea of this strange creature, respecting which naturalists have been greatly perplexed; many still doubting whether its gills are permanent; that is, whether it is not the Tadpole of a species, the perfect form of which is yet to be discovered. The length of the Axolotl is eight or ten inches; its general colour is grey, spotted with black. According to Hernandez, the flesh of this aquatic Reptile is very agreeable and wholesome, and resembles that of an eel.

#### GENUS SIREN.

We now come to the Sirens, (*Siren*, Linn.) These are eel-like animals, with three gill-tufts on each side; and utterly destitute of hinder limbs. The anterior limbs are feeble; and the toes small and clawless. The head is flattened, the muzzle blunt, the mouth small. The lower jaw has teeth, the upper none; but there are ranges of teeth on the palate. The eye is very small; and the ear concealed.

The LACERTINE SIREN (*Siren lacertina*, Linnæus,) was discovered by Dr. Garden, who, in the year 1765, sent a specimen to Linnæus, with an anatomical description.

This species attains to the length of three feet, and is



MENOPHRANCHUS LATERALIS.





of a blackish colour; its feet are furnished with four toes; and the tail is flattened at the sides. The Lacertine Siren inhabits the marshes of Carolina, and especially the muddy, swampy grounds where the cultivation of rice is carried on; occasionally it leaves the swamp, and comes upon dry land. Worms and insects are its food. Dr. Garden asserts, that it will devour snakes; and also states, that it utters a sound like the voice of a young duck. These points are, however, denied by Barton.

Two smaller species are known; one the INTERMEDIATE SIREN, (*S. intermedia*,) and the STRIPED SIREN, (*S. striata*,) both natives of Carolina. The latter has only three toes on each foot; and its gills are but slightly fringed.

Here, perhaps, really terminates the series of the Amphibia; but recent discoveries have made us acquainted with two extraordinary beings, so intermediate between fishes and Amphibia, that naturalists and anatomists are divided in opinion as to their real situation in the animal kingdom. The possession of scales, which cover the body, (not naked as in the Amphibia,) and of true gills, and gill-covers, with other points of organization, ally them to fishes. The possession of lungs, however, on the other hand, allies them to the Amphibia. The body is altogether fish-like; a fin runs along the back, and surrounds the tail; the nostrils are mere pits, as in fishes. There are thirty-six pairs of simple slender ribs; and the bones are green. There are four rudimentary limbs in the form of simple tentacles, ending in a fine point.

#### GENUS LEPIDOSIREN.

The first species of Lepidosiren was discovered by Professor Natterer, who obtained two specimens, one found in a swamp, on the left bank of the river Amazon;

the other was taken in a pond near Borba, on the river Madeira. On these specimens, Professor Natterer established the genus *Lepidosiren*; and gave to this South American species the specific title of *Paradoxa*. (See "Annals of the Museum of Vienna.")

The *LEPIDOSIREN PARADOXA* is regarded by Natterer as within the pale of the Amphibia, notwithstanding its cartilaginous skeleton, its scales, and gills. In this species, the tentacles are not jointed, and the heart possesses a double auricle.

The second species is a native of the river Gambia, Western Africa, whence specimens were brought over, in 1837, by Thomas C. B. Weir, Esq.; and one of them was presented to the Royal College of Surgeons in London; a detailed and elaborate account of which, by Professor Owen, is published in the eighteenth volume of the "Linnæan Transactions." This species, *LEPIDOSIREN ANNECTANS*, Owen, has the tentacles many-jointed; and a series of mucous pores on the sides of the head. In some specimens, two very minute tentacles accompany each of the pectoral or anterior ones. The engraving opposite page 12 represents this interesting and extraordinary animal.

From what we can glean respecting the Gambia *Lepidosiren*, it appears to bury itself in the mud, along the banks of the river it inhabits; and there, folding itself up, to pass a great portion of its time in a state of torpidity. Pieces of hard clay, bearing the impressions of these animals, have been brought over to England. Sir W. Jardine, in his observations on this creature, refers to the circumstance as follows:—"Miss Weir," he writes, "in allowing us to examine the specimens of the *fish*, accompanied them with the following note, and a piece of the hard clay, alluded to in the "Transactions of the Linnæan Society," bearing the impression of the



AXOLOTL.



animal, as if it had lain for some time imbedded in it, and with the earth in such a state as to allow the form of the cast to be retained.

"Fish taken in the summer of 1835," says the note referred to, "on the shore of Macarthy's island, about three hundred and fifty miles up the river Gambia. They were found about eighteen inches below the surface of the ground, which during nine months of the year is perfectly dry and hard; the remaining three months it is under water. When dug out of the ground, and put into water, the fish immediately unfold themselves, and commence swimming about. They are dug up with sharp stakes, and are used for food."

A specimen, preserved in spirits thus rolled up, is enveloped in dried leaves, "which might have accumulated at the bottom of the water of the inundated ground; several have adhered to it, and were kept in their place by means of a large supply of mucous, still investing the specimen, and which may serve as a provision to assist in preserving life during the torpidity or hybernation of the animal." ("Annals and Magazine of Natural History," March, 1841.)

The motion of the *Lepidosiren* in the water, resembles that of a fish; it propels itself along by means of the paddle-like action of the tail; and the tentacles, doubtless, assist as directors. Perhaps they are of use, also, in enabling the creature to raise its body upon any substance in the water, or in dragging itself along shallow places, or up the bank. At present, however, we have little positive information as to the habits and instincts of the *Lepidosirens*: we contemplate them with surprise; and we feel that we see in them proofs of consummate power and wisdom.

Here, then, we close our outlines of the Reptilia. We have followed the chain from the Tortoises to the fish-like *Lepidosiren*, of disputable rank; and if we have not

seen the hand of God in these lower creatures, which own him as their Maker, we must have wilfully blinded the eyes of our understanding.

The study of natural history leads us at once to the omnipotent Creator; and establishes, by proofs clear as the light of day, his mysterious existence—the basis of religion. But gladly as the Christian surveys these multiplied proofs—these tokens of Divine power and contrivance—these evidences which the atheist cannot destroy, he advances still farther; he acknowledges that these are great things, and show forth the power of the Most High; but he forgets not that God has created him with an immortal soul; that God has, by the incarnation and death of Christ, established for him a way of salvation, and promised the guidance of his Holy Spirit to lead him to a brighter world, where the poison of the adder is not known: to a glorious Eden, which the trail of the serpent has never polluted. “Of him, and through him, and to him, are all things: to whom be glory for ever. Amen,” Rom. xi. 36.















